Wartime employment of women in the metal trades ...

National Industrial Conference Board

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Wartime Employment of Women in the Metal Trades

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Research Report Number 8
July, 1918

National Industrial
Conference Board

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National Industrial Conference Board

15 BEACON STREET, BOSTON, MASS.

THE National Industrial Conference Board is a co-operative body composed of representatives of national industrial associations, and organized to provide a clearing house of information, a forum for constructive discussion, and machinery for co-operative action on matters that vitally affect the industrial development of the nation.

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WARTIME EMPLOYMENT OF WOMEN IN THE METAL TRADES

RESEARCH REPORT NUMBER 8
JULY, 1918

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Foreword

THE entrance of the United States into the world war has sharply focused attention of employers on the problem of labor supply. At the same time, British experience with women in munition industries has indicated a source from which industrial workers may be drawn to replace men called into national service. In order definitely to ascertain the facts regarding similar employment of women in the United States, the National Industrial Conference Board has assembled information from representative manufacturers in the metal trades.

This report has been prepared chiefly for the information of manufacturers who contemplate the introduction of women workers into their establishments. While the investigation was restricted to the metal trades as the particular branch of American industry most vitally affected by the war, the experience recorded and the conclusions drawn therefrom are applicable, at least in part, to other industrial fields.

The report confines itself to a study of results of the employment of women in new occupations as reflected in output and other factors directly contributing to manufacturing efficiency; it does not discuss the broad social aspects of the subject.

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Wartime Employment of Women in the Metal Trades

I

INTRODUCTION

The beginning of the world war, however far-reaching its influence on women's employment, does not mark the beginning of their industrial activities. In 1910 there were 8,075,772 women engaged in gainful occupations in the United States as against 30,091,564 men. In 1914, of 8,263,153 workers in manufacturing industries, 1,649,687 were women.

In the last twenty-five years, moreover, the employment of women in manufacturing has increased more rapidly than that of men. Hence, the expansion of their activities at this time may be regarded, not as a radical innovation, but rather as an acceleration of a normal development.

WOMEN IN THE METAL TRADES BEFORE THE WAR

As early as 1867, women[1] were grinding drills, tending light machines, and performing filing operations in a machine shop in New Bedford, Mass. By 1872 they were commonly employed in the manufacture of nails and tacks. Gradually women were introduced into similar occupations in other industries, as in the manufacture of electrical machinery, apparatus, and supplies, which in 1914 engaged a larger number of women than any other branch of the metal trades. The following table shows the number of women, and their proportion to the total wage earners in some of the metal trades in which they were most extensively employed in 1914:

[1] 61st Congress, 2d Sess. U. S. Senate Document No. 645. History of Women in Industry in the United States. Washington, 1911.

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TABLE I. NUMBER AND PERCENTAGE OF WOMEN WORKERS IN THE METAL TRADES IN THE UNITED STATES, 1914

(Compiled from Abstract of Census of Manufactures, 1914[a])

INDUSTRY	Number	Per cent of total workers
Total	98,112	4.6
Automobiles, including bodies and parts	2,240	1.8
Brass, bronze, and copper products	2,511	6.2
Buttons	5,214	35.9
Carriages and wagons and materials	771	1.5
Cash registers and calculating machines	558	6.2
Copper, tin, and sheet-iron products	10,798	13.5
Cutlery and tools, not elsewhere specified	2,755	8.2
Dental goods	1,162	37.7
Electrical machinery, apparatus, and supplies	23,527	19.9
Files	531	12.2
Firearms and ammunition	3,648	19.7
Foundry and machine-shop products	12,334	2.2
Gas and electric fixtures and lamps and reflectors	3,512	19.5
Gold and silver, leaf and foil	597	52.6
Instruments, professional and scientific	1,077	15.2
Iron and steel, steel works and rolling mills	943	0.4
Iron and steel, bolts, nuts, washers, and rivets, not made in steel works or rolling mills	1,154	10.8
Iron and steel, nails and spikes, cut and wrought, including wire nails, not made in steel works or rolling mills	663	25.1
Jewelry	6,345	22.4
Needles, pins, and hooks and eyes	2,524	47.3
Phonographs and graphophones	950	10.1
Screws, wood	1,174	26.4
Sewing machines, cases, and attachments	923	5.1
Silverware and plated ware	2,414	15.3
Surgical appliances and artificial limbs	2,198	46.1
Tinplate and terneplate	621	11.9
Typewriters and supplies	1,423	12.8
Wire	706	4.0
Metal trades, each employing less than 500 women	4,839	0.7

a The compilation is that of the National Industrial Conference Board, not of the census.

In 1914, women comprised only 4.6% of the total labor force in those metal trades in which they were employed. Of 2,140,789 employees in these trades, only 98,112 were women sixteen years of age or over; 10,803 were boys and girls under sixteen, among whom the girls were doubtless relatively few; 2,031,874 were adult men. These figures include clerical workers.

As far back as 1908, though the number of women employed in the metal trades was comparatively small, the operations performed by them covered a wide range. Table 2 gives a considerable number of these operations, although it is not necessarily inclusive, since the investigation from which the data were compiled covered only selected establishments.

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TABLE 2. OPERATIONS IN THE METAL TRADES PERFORMED BY WOMEN IN THE UNITED STATES IN 1908[a]

BOLTS AND MACHINE SCREWS
- Feeding presses, Assembling
- Operating threading and tapping machines

WOOD SCREWS
- Tool grinding, Tool setting
- Feeding screws to machines

NAILS AND TACKS
- Sorting nails
- Operating cutting presses

BOTTLE CAPS
- Feeding presses, Enameling
- Operating stamping machines

CAST BRASS
- Coremaking, Packing
- Buffing (occasionally)

SHEET BRASS
- Coremaking, Assembling
- Attending automatic machines
- Operating foot presses, power screw drivers, riveters, power presses
- Lacquering, Soldering
- Work in nickel plating rooms as handlers
- Light work in dipping rooms
- Work on special machines

CORSET STEELS
- Operating automatic machines
- Covering strips with cellulose
- Operating rivet presses, power presses, foot presses, shaping machines, tumbling barrels
- Japanning

CUTLERY
- Feeding planers (occasionally)
- Packing, Inspecting

ENAMELED WARE
- Operating presses (occasionally)
- Dipping

FIREARMS AND AMMUNITION
- Polishing and inspecting gun barrels
- Inspecting parts of locks
- Assembling locks
- Operating annealing machines (cartridges)

FOUNDRIES
- Coremaking

HARDWARE
- Operating spinners, reamers, stamping presses, staying machines, drill presses, punch presses
- Work in plating room
- Cleaning, Scratch brushing, Enameling

JEWELRY
- Soldering, Assembling
- Burnishing (occasionally)
- Polishing (occasionally)
- Operating bending machines (occasionally)

METAL BUTTONS, NOVELTIES AND SPECIALTIES
- Operating stamping presses
- Operating automatic machinery
- Grinding

SAWS AND FILES
- Varnishing, Wiping, Packing
- Operating stripping and cutting machines

TIN-FOIL
- Handling completed foil
- Packing, etc.

TINPLATE
- Opening sheets of metal
- Branning, Inspecting

TIN CANS AND TINWARE
- Operating ending machines, testers, Inspecting, Japanning

TYPE FOUNDRIES
- Inspecting, Sorting, Packing

WIRE CLOTH
- Tending looms
- Sewing webs of cloth together

[a] 61st Congress, 2d Sess. U. S. Senate Document No. 645. Employment of Women in the Metal Trades. Washington, 1911.

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EXTENT OF SUBSTITUTION OF WOMEN FOR MEN

Clear distinction should be made between the normal employment of women and the substitution of women for men. The wide variety of work in which women are now engaged may easily create an exaggerated idea of the extent of such substitution. While no complete data are available, the results of some recent studies indicate that women are not replacing men in industry to any great extent. The Merchants' Association of New York stated in a report published in November, 1917:

> Careful investigation has failed to reveal that there has as yet been very much substitution of female employees. This does not mean that women are not used extensively in industry, for women have been regularly employed in a great many lines of manufacturing, and form a more important element in our labor supply than is usually thought. For instance, of 160 employers in New York City and vicinity who reported concerning the substitution of female workers in their factories or offices, only 35 are using female workers more extensively than formerly. Of these only 9 have substituted any large number of women in positions formerly filled by men exclusively; 15, while using women more extensively than in the past, are doing so only in positions which have always been filled by women to some extent; and the remaining 11 are substituting women to only a slight extent.

Another investigation[1] among 70 large employers showed that less than half of them had more women workers on their force than were employed under normal conditions. One firm reported that it employed 143% more women, another 75% more, but in most cases the average increase was from 1% to 5%.

The New York State Industrial Commission, on the basis of answers to a questionnaire sent in August, 1917, to 1,600 of the largest employers of labor in the state, reported that "the results were rather surprising in the relatively small number of women who had been substituted for men".

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[1] National Association of Corporation Schools Bulletin, October, 1917.

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According to a survey of industrial conditions in New York State, made by the United States Department of Labor at the end of 1917, women workers comprised only one-tenth of the labor force in 500 factories filling war orders, and employing an aggregate of 168,446 persons. However, between the spring of 1917 and 1918, 2,180 women were substituted for men on 6 steam railways in New York State, 1,346 on electric railways in New York City and vicinity, and 2,080 in 10 plants engaged in the manufacture of munitions and instruments.

The proportionate increase in employment of women appears to have been particularly marked in the war industries, especially in the metal and machine trades. For instance, the National League of Women's Service has estimated from surveys made in 15 states that 1,266,000 women are now engaged in industrial work directly or indirectly necessary for carrying on the war. These figures are based on a known increase in specific establishments and an assumed normal increase of 20% over the number employed in 1910. Of the total number, 100,000 are employed in munition plants and aeroplane factories as compared with approximately 3,500 in the last census year.

PURPOSE AND SCOPE OF INVESTIGATION

Because the metal trades are of predominant importance to the conduct of the war, information regarding employment of women in these industries is of special value to manufacturers who are considering the introduction or substitution of women workers in new occupations. Hence the present investigation has been confined to an inquiry into the extent to which women are engaged in manufacturing operations in the metal trades, their efficiency, wages, hours of work, working conditions, and other factors, such as attendance, labor turnover, and necessary changes in plant, machinery, and equipment.

The investigation was carried on by means of a schedule of inquiry sent during April and May, 1918, to about 600 selected establishments, where it seemed probable that women were employed on metal manufacturing processes. In some cases the schedule was supplemented by field inquiries.

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The widespread interest felt by manufacturers in the problem is reflected by their response. Replies were received from approximately 330 establishments; but of these, only 131 employed female labor in manufacturing processes. Out of a total labor force of 384,709 in these 131 establishments, 49,831 were women as against 334,878 men; the proportion of women was 12.9%.[1]

The information gathered during the inquiry does not indicate a great increase in the female labor force as yet, except in a comparatively small number of establishments, more particularly those engaged in manufacture of war materials. Many employers, however, indicated an intention to reorganize their plants so as to utilize female labor in the near future.

It is not possible to determine what percentage of the total number of women employees in the 131 establishments has been added or substituted on work performed by men previous to August, 1914. For 96 establishments which furnished definite figures on this point the women added or substituted during the period since that date number 10,801 out of a total of 34,667 female employees, or 31.2%; 5,107, or nearly 50%, have been added or substituted in 10 munition establishments.

[1]The geographical distribution of establishments replying to the schedule was as follows:

Canada	1	Minnesota	1
California	1	Missouri	2
Connecticut	16	New Jersey	8
Illinois	5	New York	21
Indiana	4	Ohio	27
Iowa	1	Pennsylvania	7
Massachusetts	14	Rhode Island	2
Michigan	20	Wisconsin	1
			131

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II

OUTPUT AND WAGES OF WOMEN

Table 3, compiled from replies to the schedule of inquiry, covers 127 establishments,[1] employing 324,205 men and 47,941 women, and indicates for each establishment its product, the number of men and women employed, the number added or substituted on men's work since August, 1914, the occupations of the women, and presents abstracts from the employers' statements as to the wages and output of women compared with those of men.

In this table, the establishments have been grouped on the basis of their normal product. In numerous cases, establishments were also engaged in the manufacture of munitions. Since, however, the operations on which women were employed is the important consideration, it was considered advisable to use the classification here adopted.

In addition to the information secured from employers in the metal trades, scattered replies were received from a few other industries. Since the information was not sufficient to permit of conclusions, it has not been included in this report. In many of these instances, moreover, there had been no increase in the list of occupations of women since the outbreak of the war. The experience reported by these manufacturers in other lines was broadly similar to that here presented by the metal trades, and therefore indicates, as already pointed out, that the conclusions reached for metal trades are applicable to many other industries.

[1]This total excludes three establishments which did not furnish sufficient information, and the only Canadian establishment reporting.

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TABLE 3: OUTPUT AND WAGES OF WOMEN COMPARED WITH THOSE OF MEN, IN 127 ESTABLISHMENTS, BY INDUSTRIES

(National Industrial Conference Board)

Explanatory Notes;

a—The figures in this column include clerical employees, in the majority of establishments.

b—The figures in this column include clerical employees in a few cases, but their number is practically negligible.

c—*Italics* in this column indicate occupations on which women were employed previous to August, 1914; SMALL CAPITALS indicate occupations on which women were employed previous to August, 1914, and on which their employment has been subsequently extended; Roman type indicates occupations on which women have been newly introduced since August, 1914. Clerical occupations are not designated.

Serial number and product of establishment, and number of men and women employed (*a*).	Number of women added or substituted on men's work since August, 1914 (*b*).	Occupations of women (*c*).		Wage rates of women compared with rates of men so far as reported.	Abstract of employer's statement as to wages.	Abstract of employer's statement as to output.
AUTOMOBILES AND AUTOMOBILE ACCESSORIES						
No. 1 Automobiles 12,021 men 815 women	390	Drill press Gear machine Lathe Milling machine Punch press *Coremaking*	*Sewing machine* BENCH WORK Inspecting Stock room attendant Tool room attendant		Women do not receive same rate of pay, because it is necessary to provide extra help for handling stock and setting up machines; average earnings for female help as compared with male are about 60% to 65%.	Women as efficient as men on drill presses, light bench-work, and light inspection: on punch presses approximately equal, but necessary to provide die setters, start machines and place stock so that women do not do lifting. In light stock handling about as efficient; on medium heavy bench work 75% to 80% as efficient.
No. 2 Automobiles 9,034 men 461 women	277	Drill press, light Lapping machine Shaving machine Milling machine Bench work Stock room attendant	*Electric wiring* *Cutting and sewing leather for bodies* Inspecting, light ASSEMBLING, LIGHT	Time, less	Women receive two-thirds men's day rate on same job, but same premium. Piece rates not stated.	On machine work, not as efficient as men, because women lack mechanical knowledge; on stock handling, inspection, etc., sometimes better than men, more thorough and careful.
No. 3 Automobiles 32,954 men 371 women	100	*Machines, light* *Bench work, light* Putting covers on coil units and testing	Soldering Adjusting *Assembling*	Time, equal	No women on piecework.	Women do 10% less than men; though faster, they have less endurance.
No. 4 Automobiles 836 men 105 women	Not stated	Machines Bench work Inspecting	Disassembling chassis		Wages of women same as those of men, considering character of work.	Output of women same as that of men.

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No. 5 [illegible]						
Automobiles 5,630 men 315 women	72	Sewing machine Coremaking			We aim to pay practically same for output as when men were on the job. On sewing machines men made about 45c per hour; women earn about 35c.	Women on sewing machines do slightly less than men; on light coremaking, as much as men did formerly.
No. 6						
Automobiles 875 men 89 women	11	*Sewing machine* *Pasting* Back stuffer Inspecting			Women receive less pay than men.	
No. 7						
Automobile accessories 1,250 men 450 women	300	Drill press Lathe, hand screw Lathe Milling machine Slot machine	Machines, practically all light Inspecting, light *Armature winding* *Assembling, light*	Piece, equal	Time rates not stated.	Equal.
No. 8						
Automobile signals 285 men 100 women	100	Drill press, light Foot press, light Power press, light Assembling		Piece, equal	No women on time work.	Equal.
No. 9						
Automobile bodies and aeroplane bodies 6,350 men 150 women	Not stated	Sewing machine, aeroplane upholstery	*Sewing machine, automobile upholstery*			Too early to judge.
		(*By Departments*)				
No. 10						
Automobiles 9,166 men 834 women	423	Drill Gear Mill Press Auto B & S Threading Inspection Tool room Tool repair Tool store	Indirect material Fitting Motor Transmission Trimming Store Carpenter Receiving Stock Repair Shipping	Piece, equal	Almost all women engaged in machine work are paid piece rates, their rates being invariably same as men's. Women assemblers and miscellaneous employees are paid by the hour, commencing at 25c and raised according to ability. Time rates not stated.	Women's output almost invariably greater, in some cases disproportionately greater, than men's.

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TABLE 3: OUTPUT AND WAGES OF WOMEN, ETC.—*Continued*

Serial number and product of establishment, and number of men and women employed (*a*).	Number of women added or substituted on men's work since August, 1914 (*b*).	Occupations of women (*c*).		Wage rates of women compared with rates of men so far as reported.	Abstract of employer's statement as to wages.	Abstract of employer's statement as to output.
TYPEWRITERS AND OTHER LIGHT MACHINES						
No. 11 Adding machines 3,469 men 821 women	253	DRILL PRESS Milling machine *Punch press* Riveting machine *Bench work* Stock room attendant	BURRING Pinning *Riveting* Adjusting ASSEMBLING, LIGHT Inspecting		Equal pay for equal work.	On all work except inspection of adding machines and adjusting, women are equal to men in regard to output.
No. 12 Cash registers 4,328 men 654 women	Not stated	Drill press, heavy *Drill press* *Engraving machine* MILLING MACHINE *Printing press* Tapping machine BENCH WORK	*Stenciling* Inspecting Cabinet work ASSEMBLING Tracing *Bindery work* *Laundry work*	Piece, equal Time, equal		Women's work compares very favorably, but too early to express final judgment.
No. 13 Check protectors 326 men 52 women	52	Assembling Printing		Piece, less Time, less	Women's rates about 20% less than men's.	Possibly 10% more actual work done by women than by men before them.
No. 14 Composing machines 1,600 men 294 women	None	*Machines* *Bench work* *Inspecting*		Piece, equal Time, less		Not on same processes.
No. 15 Typewriters 1,228 men 525 women	250	*Machines* *Bench work* *Assembling*	Stock room attendant	Piece, equal Time, less	Piece rates for women occasionally higher than for men. Day rates less, because it takes women longer to learn.	In most cases, equal; some less, some more.

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No. 16 Typewriters 1,697 men 489 women	Not stated	DRILL PRESS Filing machine *Foot press* PUNCH PRESS *Hand milling machine* *Lapping machine* *Speed lathe*	Milling machine TAPPING MACHINE *Thread rolling machine* *Soldering* Japan spraying *Assembling, light*	Piece, less Time, less	Day rate for women is 40% lower than for men. Should jobs formerly done by men be transferred to women, no change in women's rate takes place.	Production records for several jobs show that output for women is identical with output of men on same work.

ELECTRICAL MACHINERY, APPARATUS, AND SUPPLIES

No. 17 Cranes, electrical motors, controllers 425 men 45 women	8	Drill press, light *Bench work, light* Stock room attendant		Piece, equal Time, equal		About average.
No. 18 Electrical motors, meters, etc. 2,985 men 665 women	6	*Machines* *Bench work* Winding induction motor stator coils	*Winding* *Taping* *Testing* ASSEMBLING METERS	Piece: some equal some less Time, less	For assembling of meters women are paid 84c per 100 less than men on one type, same pay on other types. For winding induction motor stator coils, pay is same.	Women's output equal to men's on assembling meters; on winding induction motor stator coils, 20% less than men's.
No. 19 Electrical motors 497 men 108 women	108	Insulating and winding armatures Tool room attendant Inspecting Assembling, light		Piece, equal Time, equal		Nearly equal.
No. 20 Turbines, electrical generators and motors, electrical apparatus 20,913 men 2,000 women	Very few	*Drill press, light* *Machine taping* *Punch press* *Stamping nameplates* *Winding armatures*	*Winding coils* *Pasting mica* *Assembling, light* *Elevator operator* *Stock room attendant*			

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TABLE 3: OUTPUT AND WAGES OF WOMEN, ETC.—*Continued*

Serial number and product of establishment, and number of men and women employed (*a*).	Number of women added or substituted on men's work since August, 1914 (*b*).	Occupations of women (*c*).		Wage rates of women compared with rates of men so far as reported.	Abstract of employer's statement as to wages.	Abstract of employer's statement as to output.
ELECTRICAL MACHINERY, APPARATUS, AND SUPPLIES—*Continued*						
No. 21 Electrical apparatus and supplies 13,000 men 1,700 women	300	Drill press Grinding Milling machine Punch press Sewing machine *Building up composite insulation* Assembling coils Coil pressing WINDING COILS Coils, form and pull Connecting *Coil insulating* Core building Insulating Stock room attendant Janitor	Micarta and composition work *Mica splitting* *Taping* Material cutting Riveting Soldering Lamp repairing Assembling Painting Inspecting Packing Weighing Shipping Messenger	Time, less	Piece rates not stated.	Equal.
No. 22 Electrical apparatus and supplies 9,765 men 3,485 women	282	MACHINES, LIGHT Punch press *Winding* *Insulating*	MOTOR TESTING *Assembling* *Coremaking* Janitor	Piece, equal Time, less	Women's day rates 80% of men's rates.	Comparative figures not available. In some few cases where nimbleness of fingers is main factor indications are that women's output will equal men's.
No. 23 Electrical apparatus and supplies 4,700 men 900 women	138	Drill press Lathe Assembling, light Screw machine Inspecting			Equal pay on all machine operations.	Women's production somewhat below that of good men. This will gradually improve as women acquire experience.

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No. 24 Electrical apparatus and supplies 6,400 men 1,045 women	Not stated	*Lathe, light* Machines, light Bench work, light Sorting *Inspecting* *Assembling*			Women receive slightly less pay as a rule than men, although margin of difference is gradually decreasing.	
No. 25 Electrical apparatus and supplies 610 men 190 women	12	Drill press Machines, light Bench work *Assembling*	*Boxing* *Labeling* Drafting *Coremaking*	Time, equal	Piece rates not stated.	About the same.
No. 26 Ignition apparatus 530 men 198 women	25	Drill press Bench work			Women receive less pay than men.	Women's output 80% of men's.
No. 27 Ignition apparatus 1,200 men 900 women	600	Drill press Bench lathe Hand turret lathe	Punch press Riveting machine *Assembling*	Piece, less Time, less	Women's wages about 10% less than men's.	Women show increase of 10% to 15% over men's production.
No. 28 Ignition apparatus 1,700 men 300 women	Not stated	Winding high tension coils		Piece, less Time, less	Women's rates about 30% less than men's.	Work of women compares favorably.
No. 29 Ignition apparatus 182 men 368 women	9	Inspecting Elevator operator Messenger			Women inspectors receive about 25% less; men inspectors usually skilled mechanics; girls had no previous experience; elevator operators and errand girls same rates as men.	Practically no difference. Because of special gauges, calipers, etc., we have designed, women can handle the work with same speed as men.

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TABLE 3: OUTPUT AND WAGES OF WOMEN, ETC.—*Continued*

Serial number and product of establishment, and number of men and women employed (*a*).	Number of women added or substituted on men's work since August, 1914 (*b*).	Occupations of women (*c*).	Wage rates of women compared with rates of men so far as reported.	Abstract of employer's statement as to wages.	Abstract of employer's statement as to output.
ELECTRICAL MACHINERY, APPARATUS, AND SUPPLIES — *Continued*					
No. 30 Ignition apparatus 2,020 men 580 women	Not stated	Grinding machines Turret lathe Inspecting *Assembling, light* Assembling, all classes Drafting Tool designing	Piece, less Time, less	Women's wages average 20% less, but increase as their efficiency increases.	Production of women in some cases more and in some cases less than men's. In general, on repetitive small work women excel.
No. 31 Gasoline-electrical lighting sets 949 men 211 women	(Plant established since August, 1914) 211	Machines, light Inspecting Assembling, light	Piece, less Time, less		On some kinds of work women produce more than men, on others less. On repetitive work women's output better.
No. 32 Insulated wires and cables 469 men 47 women	None	*Braiding* *Spooling*	Time, equal	Women replaced boys and receive wages equal to those of boys, but on weekly basis. No women on piecework.	Not comparable.
No. 33 Molded insulation 189 men 9 women	9	Inspecting	Piece, equal Time, equal	Work formerly done by boys. Day rate plus bonus in some cases.	Work done by women same in quantity but more accurate.
No. 34 Suction cleaners, motor washers 77 men 14 women	None	*Assembling, light*		All have day rates — all have some piecework jobs.	

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FOUNDRY AND MACHINE SHOP PRODUCTS

No. 35 Malleable castings 369 men 62 women	30	Pattern making *Coremaking* Core packing Core carrying Molding Chipping Sorting	Piece, equal Time: some equal some less	Day rates on some jobs 25% less for women.	Women core carriers and core packers more satisfactory than men. For sorting castings, women better, more careful. Molding, experimental but favorable. Coremaking, women very efficient. Chipping, satisfactory, but output less; patternmaking experimental. Workers largely Belgians accustomed to heavy work in their own country.
No. 36 Malleable castings 300 men 50 women	None	*Coremaking*			
No. 37 Malleable castings 313 men 16 women	None	*Coremaking*	Piece, equal	No women on time work.	Very favorable.
No. 38 Malleable castings 452 men 32 women	Not stated	*Coremaking* *Sorting*	Piece, equal	All women doing same work as men are on piecework. Time rates not stated.	Favorable.
No. 39 Malleable castings 395 men 54 women	None	Coremaking Inspecting		New work; all day rates.	Favorable.
No. 40 Automobile cylinder castings 132 men 9 women	Not stated	COREMAKING, LIGHT	Piece, equal Time, less	Women's day rates 15% to 20% less than men's.	Practically same production from women as from men.

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TABLE 3: OUTPUT AND WAGES OF WOMEN, ETC.—*Continued*

Serial number and product of establishment, and number of men and women employed (*a*).	Number of women added or substituted on men's work since August, 1914 (*b*).	Occupations of women (*c*).		Wages rates of women compared with rates of men so far as reported.	Abstract of employer's statement as to wages.	Abstract of employer's statement as to output.
FOUNDRY AND MACHINE SHOP PRODUCTS — *Continued*						
No. 41 Steel castings 686 men 34 women	None	*Coremaking*			Women's earnings about 22c an hour, men's about 45c. After first week, paid by piece rate.	Women on lighter work; output not comparable.
No. 42 Radiators 530 men 20 women	14	Coremaking		Time, equal	No women on piecework.	Very favorable.
No. 43 Machine tools, automobiles, shells, guns, gun mounts 1,990 men 153 women	90	Automatic screw machine Broaching machine Drill press Engraving machine Lathe	Milling machine Slot machine Bench work Inspecting Toolserving *Coremaking*	Piece, equal Time, equal	Rates are identical, but male employees are able to earn more on piecework because of their ability to stand up under the work for longer periods.	Favorable.
No. 44 Machine to ls 1,297 men 35 women	All except clerical	Grinding Tool grinding Bench work	Milling machine Machines	Time, equal	No women on piecework.	Women's efficiency equal to that of men.
No. 45 Machine tools 6,200 men 1,100 women	All except clerical	Cutter grinding Gear machine Hand lathe Milling machine Other machine tools	Filing Riveting Inspecting Assembling Tool room attendant	Piece: some equal some less Time: some equal some less	Intend to pay equal rates when initial expense for changes has been made up.	Women average well, may surpass men later.
No. 46 Machine tools 643 men 31 women	16	Tracing		Piece, equal Time, equal		10% more output by women; neater.

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No. 47 Machine tools 1,030 men 75 women	75	Tracing		Time, less	Women's pay is somewhat less than men's; no women on piecework.	Equally good.
No. 48 Machine tools 625 men 25 women	3	Blueprint work		Time, equal	No women on piecework.	About the same.
No. 49 Machine tools, small tools 516 men 54 women	All except clerical	Etching Lapping gauges Stamping Inspecting		Time, equal	No women on piecework.	Women's output slightly less than men's except on etching.
No. 50 Machine tools, small tools 379 men 140 women	Not stated	Grinding machine Lathe *Machines, light* *Wrapping*	Machines *Inspecting* *Counting*	Piece, equal Time, less		
No. 51 Machine tools, small tools 451 men 115 women	115	Filing machine Drill clearing Sorting Inspecting		Piece, less Time, less	In some cases rates are equal, but it is necessary to have men give assistance and generally women receive only 75% of men's rates.	Women average about 80% of men's production.
No. 52 Machine tools, small tools 850 men 150 women	Not stated	Cylindrical grinding Lathe Screw machine *Bench work*		Piece, equal Time, less		
No. 53 Engines, blowers 778 men 76 women	8	Punch press Assembling, light		Time, equal	No women on piecework.	Output of women equal or greater than that of men on same work.
No. 54 Ventilating equipment 1,580 men 30 women	30	Filing turbine bucket wheels Making small portable set runners			Slightly less pay to women for same class of work.	Compares very favorably.

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TABLE 3 : OUTPUT AND WAGES OF WOMEN, ETC.—*Continued*

Serial number and product of establishment, and number of men and women employed (*a*).	Number of women added or substituted on men's work since August, 1914 (*b*).	Occupations of women (*c*).		Wage rates of women compared with rates of men so far as reported.	Abstract of employer's statement as to wages.	Abstract of employer's statement as to output.
FOUNDRY AND MACHINE SHOP PRODUCTS—*Continued*						
No. 55 Agricultural machinery 1,050 men 20 women	Not stated	Electric cranes, light Janitor *Coremaking*		Piece, less Time, less	30% less pay for women than for men.	Output of three women equal to that of two men.
No. 56 Agricultural machinery 505 men 20 women	All except clerical	Coremaking		Piece, less Time, less	Women's wages 20% less than men's.	Equal.
No. 57 Refrigerating and electrical machinery 308 men 39 women	11	Drill press Bench work, commutators Bench work, light Soldering commutators Soldering, light	Taping fields *Winding, taping, and webbing coils* *Winding armatures and stator coils* Winding fields	Piece, equal Time, equal	Majority of work is on premium basis.	Women are producing just about same amount of work.
No. 58 Air compressors and pumps 726 men 24 women	None	*Coremaking, light*			No basis for comparison.	No men on light coremaking but should expect girls to make better time.
No. 59 Turbines 700 men 50 women	All except clerical	Inspecting		Time, less	All women on day rate 20% less than that of men.	Too early to judge.
No. 60 Elevating and conveying machinery 2,000 men 300 women	73	Drill press, light Hobbing machine Lathe Bench work, light Coremaking	Electric welding *Winding armatures* *Winding field coils* Inspecting	Time, equal	No women on piecework.	Women seem equally good. Period not of sufficient duration for accurate comparison.

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No. 61 Gears 706 men 49 women	49	Acme automatic Drill press Fellows gear shaper	Gleason generator Inspecting Bench assembling	Time, equal	No women on piecework.	Women overrun men on all work.
No. 62 Gears, sprocket wheels, chains 490 men 56 women	10	*Assembling chain parts* Inspecting		Piece, equal Time, equal		Women do 20% better than men.
No. 63 Gears 43 men 9 women	9	Broaching machine Drill press	Grinding Sand blasting, very light.	Piece, equal Time, less		15% to 25% better output by women than by men.
No. 64 Valves and fittings 1,300 men 20 women	20	Punch press Screw machine		Piece, equal Time, equal		About the same.
No. 65 Valves 523 men 62 women	Not stated	Machines, light Assembling *Coremaking*		Piece, equal Time, less	Day rate of women slightly lower than that of men.	Women's work compares favorably after they have become proficient; take a little longer to learn, require more attention and attendance, spoil less work and are more careful with tools.
No. 66 Valves and fittings 650 men 160 women	160	Drill press Grinding machine Lathe Threading machine Inspecting Screw machine Other light machinery except automatics		Piece, equal	Time rates not stated.	In all cases women are equal, where a man endeavoring to do a fair day's work is considered in comparison. In many cases output of women was much greater, as there seemed to be constant rivalry. Women seemed naturally more careful and produced less defective material.

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TABLE 3: OUTPUT AND WAGES OF WOMEN, ETC.— *Continued*

Serial number and product of establishment, and number of men and women employed (*a*).	Number of women added or substituted on men's work since August, 1914 (*b*).	Occupations of women (*c*).	Wage rates of women compared with rates of men so far as reported.	Abstract of employer's statement as to wages.	Abstract of employer's statement as to output.
FOUNDRY AND MACHINE SHOP PRODUCTS — *Continued*					
No. 67 Valves and hydrants 399 men 52 women	15	*Coremaking, light* Coremaking, heavier	Piece, equal Time, less	Women's day rates about 20% less than men's.	On heavier coremaking women are as rapid as, but less skillful than men.
No. 68 Detonators, turnbuckles 1,450 men 600 women	Not stated	Hand screw machine	Piece, less Time, less	All employed on day-rate basis, with about 50% earning piece rate in addition.	Women do about 75% as much as men.
No. 69 Screw machines and products 668 men 70 women	49	Drill press Hand screw machine Milling machine *Shaving machine* *Slotting machine* Inspecting *Assembling* *Packing*	Piece, equal Time, equa l		Practically the same.
No. 70 Screw machine products 150 men 50 women	Not stated	Drill press *Machine feeding* *Packing* Tapping machine *Counting*	Piece, equal Time, less	Shall pay equal day rates in near future.	Very favorable to women both in quantity and quality.
No. 71 Roller bearings 2,346 men 397 women	200	Machines, light Tool room attendant	Piece, equal Time, less	Special day rates for women.	On machine operations men produce 10% to 20% more than women.

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No. 72						
Aeroplanes 13,000 men 1,700 women	1,700	Drill press Hand milling machine Punch press Brazing, light Copper tipping Doping	Soldering Welding Making wing floats Woodworking, light Assembling, light	Piece, equal Time, less	Women's time rate about 75% of men's.	Women produce about one-half as much as men; quality of work slightly better than that of men.
No. 73						
Aeroplane motor parts 4,400 men 600 women	600	Castulating machine Nut tapping machine Semi-automatic machine	Thread cutting machine Filing Inspecting	Piece, equal Time, less	Women's day rates 33⅓% less than men's.	Just as good as, if not better than work of men.
No. 74						
Fuses, shell cases, etc. 9,000 men 3,000 women	574	*Automatic dial machine* *Automatic closing machine* Drill press Knurling machine Lathe Milling machine Primer machine PUNCH PRESSES, VARIOUS Screw machine Tapping lathe SETTING UP Machine instructor	Machine apprentice *Charging buttons* *Setting up buttons* *Bench work* *Soldering* Assembling burners *Gauging* *Lacquering* *Inspecting* *Packing* Chemist *Janitor* *Messenger*	Piece, equal Time, equal		Approximately same in various occupations.
No. 75						
Fuses 3,600 men 5,000 women	Not stated	Drill press Gear machine Hand milling machine Power milling machine Assembling	Machines, special Punch press Screw machine Inspecting	Piece, equal	Graduated bonus system in effect. No women on time work.	Greater on practically all mechanical operations.
No. 76						
Steel, munitions, fuses, etc. 28,872 men 800 women	800	Drill press Lathe Milling machine Assembling, light		Piece, equal Time, less		On drill presses and milling machines 25% to 50% faster than men; on lathes not quite as efficient; this applies to light work only.

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Serial number and product of establishment, and number of men and women employed (*a*).	Number of women added or substituted on men's work since August, 1914 (*b*).	Occupations of women (*c*).	Wage rates of women compared with rates of men so far as reported.	Abstract of employer's statement as to wages.	Abstract of employer's statement as to output.
MUNITIONS—*Continued*					
No. 77 Small metal parts 949 men 303 women	Not stated	Drill press Machines, light Inspecting *Assembling*	Piece, equal Time, less	Women 21c, men 32c per hour.	Men on night work face 207 parts per hour; girls on daywork 237. Men on nightwork drill 148 parts per hour; girls on daywork 196.
No. 78 Shells 235 men 27 women	None	*Packing* *Coremaking*		Practically same rates for same hours of service, though we do not employ women and men on same class of work.	Women's output equals from 75% to 90% of men's, depending on the individual.
No. 79 Gas and shrapnel shells, bayonets 360 men 90 women	90	Banding press Band grooving lathe Drill press Grinding machine Lathe Messenger Knurling machine Milling machine Inspecting Tool room attendant		Should we have men and women engaged on same operation, their work being equally satisfactory, no distinction in their wage, whether day or piece work. While learning, all working on day rate.	Not comparable. No women on same processes as men.
No. 80 Guns, cartridges 13,611 men 4,351 women	182	(*In Gun Dept.*) Automatic slotter Hand slot machine Drill press Hand milling machine Punch press Burring Reaming Bench work Filing Spring work Assembling Tool room attendant (*In Cartridge Dept.*) MACHINES Shaker operating Powder dispatching Charging Loading Adjusting Hustler INSPECTING *Packing*		Equal pay for equal production.	Women's output equal on lighter work; in some cases superior in quality; less on heavier processes like hand milling.

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No. 81 Rifles, machine guns, bayonets, small arms 5,504 men 806 women	Not stated	Drill press, light Riveting machine, light *Bench work, light* Assembling, light	INSPECTING Tracing Blueprint work Supervising of women	Piece, equal Time, equal		Women's output averages about same as men's; on some machining operations slightly less; on some operations requiring manual dexterity alone, slightly greater.
No. 82 Machine guns, small arms 5,306 men 694 women	694	Machines Assembling, light Polishing			Same rates for women as for men.	Women's output probably 5% greater than men's on machines women are capable of operating.
No. 83 Machine guns 3,584 men 289 women	289	*Punch press* Inspecting Assembling		Piece, equal Time, less	Same piece rates paid women on like operations. Lighter and less important operations assigned women workers with slight reduction.	Compares very favorably, women more attentive.
No. 84 Torpedoes 4,247 men 178 women	178	Bench lathe Drill press Stock room attendant	Inspecting Bench work	Piece, equal Time, less	75% of women on hourly basis with premium for excess production.	Not easily comparable.
RAILWAY EQUIPMENT						
No. 85 Electric cars, trucks, army equipment 2,673 men 175 women	85	Metal working machines Woodworking machines	Woodworking, light Painting *Cane weaving* *Curtain making*		Women paid day rate, men piece rate, where employed on same processes.	Women's output 75% of men's.
No. 86 Maintenance of equipment 3,232 men 64 women	64	Machines Coach cleaning Laborers		Piece, equal Time, equal		Better than men on cleaning. Equally good on other work where we use them.
No. 87 Maintenance of equipment 2,517 men 10 women	10	Bolt cutting machine Tapping machine Machines, light		Piece, equal Time, equal	All on piecework at times.	Compares favorably with that of men.

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TABLE 3: OUTPUT AND WAGES OF WOMEN, ETC.—*Continued*

Serial number and product of establishment, and number of men and women employed (*a*).	Number of women added or substituted on men's work since August, 1914 (*b*).	Occupations of women (*c*).	Wage rates of women compared with rates of men so far as reported.	Abstract of employer's statement as to wages.	Abstract of employer's statement as to output.
RAILWAY EQUIPMENT—*Continued*					
No. 88 Maintenance of equipment 2,943 men 37 women	9	Bolt cutting machine Sorting light scrap Nut tapping machine	Piece, equal Time, equal		No noticeable difference.
Nos. 89, 90, 91 (1) Maintenance of equipment 913 men 34 women	34	Bolt threading machine Drill press Shearing machine Repairing valves Testing valves Preparing journal packing Janitor Sorting light scrap Taking scrap from machines Smith shop labor Coach cleaning Stock room attendant	Piece, equal Time, equal		In sorting second-hand material, threading bolts, manufacturing journal packing, testing and repairing valves, sweeping and cleaning up shop, women equal men, or 100%; on drilling machines about 95%; as laborers in smith shop, 85%.
(1) This schedule covers three establishments					
TOOLS, CUTLERY, AND HARDWARE					
No. 92 Agricultural implements 1,082 men 25 women	25	Canvas department	Piece, equal Time, equal		Women's output equal to that of men or boys. Quality, if anything, superior.
No. 93 Saws, machine knives, files 604 men 30 women	All except clerical	Grinding Inspecting Assembling, light	Piece, equal Time, equal		Women's increase over men's production, 10%.
No. 94 Table cutlery 97 men 14 women	None	*Inspecting*		No basis for comparison.	Men never employed on the same work.

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No. 95						
Razors, razor blades 181 men 205 women	Not stated	*Honing machine* *Packing machine* *Riveting machine* *Stropping machine* *Cleaning razors* *Oiling blades* *Stock room attendant*	*Straightening razor parts* *Testing blades* *Inspecting* *Assembling* *Packing* *Shipping*		Practically the same wages for women as for men.	Women equally efficient.
No. 96						
Razors, razor blades 350 men 850 women	Not stated	*Grinding machine* *Honing machine* *Lathe* *Punch press* *Riveting machine* *Stropping machine* *Trimming press* *Packing*	*Lacquering* *Scratch brushing* *Wiping* *Wiring and unwiring for plating* *Inspecting* *Making leather cases*	Time, equal		Women show greater dexterity.
No. 97						
Razors, shears 319 men 167 women	None	*Honing machine* *Etching* *Assembling*	*Inspecting* *Box making* *Packing*		Women employees receive same rate of increases given men operators.	Women always considered satisfactory.
No. 98						
Machine needles 689 men 571 women	None	*Machines* *Bench work* *Packing*	*Inspecting* *Counting*	Piece, equal Time, equal		Not comparable; no replacement of men.
No. 99						
Tacks, nails 352 men 169 women	Not stated	Eyelet machines *Machines for capping lining nails and tacks* Tackmaking machines *Packing*	Painting eyelets Sticking eyelets in cardboard *Inspecting*	Piece, equal Time, equal	Where women and men do same kind of work they receive same pay.	Too early to judge.
No. 100						
Bolts, nuts 769 men 56 women	4	*Fitting nuts on bolts* *Sorting*	Sorting fancy nuts *Packing*	Piece, equal Time, equal	Same kind of work seldom performed by both men and women.	Women only few weeks on this work; compare very favorably; more steady than men.
No. 101						
Bolts, screws 263 men 159 women	56	Drill press Milling machine *Punch press automatic* *Packing*	*Shaving machine* *Threading machine* *Sorting*	Time, less	Women do lighter work, hence rates are less. Women on day rate plus piece rate over certain production, plus bonus for regular attendance.	Women average increase of 30% over men's output, work with more precision and accuracy, avoid waste.

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TABLE 3: OUTPUT AND WAGES OF WOMEN, ETC.—*Continued*

Serial number and product of establishment, and number of men and women employed (*a*).	Number of women added or substituted on men's work since August, 1914 (*b*).	Occupations of women (*c*).	Wage rates of women compared with rates of men so far as reported.	Abstract of employer's statement as to wages.	Abstract of employer's statement as to output.
TOOLS, CUTLERY, AND HARDWARE—*Continued*					
No. 102 Bolts, nuts, screws 1,172 men 26 women	None	*Labeling* *Packing*		Women paid day rates.	On packing and labeling, women 10% faster than men.
No. 103 Bolts, nuts, bar iron 950 men 300 women	None	*Bolt pointing machine* *Piling bolts* *Nut tapping machine* *Papering bolts* *Thread cutting machine* *Packing*	Piece, equal Time, less	Women's day rates about 80% of men's.	Women's output larger than men's, say at least 10% and more regular. Quantity each day can be depended on.
No. 104 Bolts, nuts, rivets, drop forgings 252 men 28 women	All except clerical	Thread cutting machine Assembling	Piece, equal Time, less		On assembling, women's output 20% increase over men's; on threading, equal to men or boys.
No. 105 Locks 53 men 22 women	None	*Punch press, light* *Stamp press* *Riveting machine* *Assembling* *Packing*	Piece, equal	No women on time work.	Women's output on other than small work equal to men's; on small work requiring nimble fingers, greater.
No. 106 Locks, builders' hardware 3,415 men 785 women	None	*Machines, light* *Bench work, light*	Piece, equal Time, equal		Substantially no difference.
No. 107 Vehicle hardware 2,500 men 300 women	None	*Bolt cutting machine* *Punch press* *Drill press* *Inspecting* *Packing*	Piece, equal Time, less	Women's day rates about 25% less than men's.	

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MISCELLANEOUS METAL PRODUCTS

No. 108 Brass and copper sheets, wire, rods, etc. 4,485 men 212 women	84	*Wire drawing* *Diamond die drilling* *Insulating wire* Die making Spooling wire *Packing, light*	Brazing wire Bundling and straightening wire *Inspecting, light* Repairing spools	Piece, equal Time, equal		Women better than boys formerly on work.
No. 109 Brass and German silver sheets, wire and rods 1,724 men 116 women	None	*Edging* *Machines* *Threading* *Foot power press* *Redrawing*		Piece, less Time, less	Rates based on minimum of 30c per hour for women, 40c for men.	
No. 110 Wire cloth, light iron work 127 men 25 women	None	*Bobbin winding* *Dandy roll work* *Sewing seams in Fourdrinier wires*			Women not on same work as men.	
No. 111 Hairpins 14 men 95 women	None	*Packing* *Paper box department*			No basis for comparison.	Very few men employed.
No. 112 Wire hardware, wire goods, metal stampings 111 men 23 women	None	*Threading* *Wire bending* *Packing*		Piece, equal Time, equal		Women produce a little more than men.
No. 113 Bed springs 199 men 45 women	None	*Jigwork, light*		Piece, less Time, less	Women's rates about 25% less than men's.	On light work women excel men; on heavier work, about 75% as efficient.
No. 114 Tin plate 544 men 23 women	5	Opening sheets		Piece, equal Time, less	Women's day rates 20% lower than men's.	In opening sheets women about 60% as efficient as men.

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TABLE 3: OUTPUT AND WAGES OF WOMEN, ETC.—*Continued*

Serial number and product of establishment, and number of men and women employed (*a*).	Number of women added or substituted on men's work since August, 1914 (*b*).	Occupations of women (*c*).		Wage rates of women compared with rates of men so far as reported.	Abstract of employer's statement as to wages.	Abstract of employer's statement as to output.
MISCELLANEOUS METAL PRODUCTS—*Continued*						
No. 115 Filing cabinets 861 men 273 women	77	Boring machine Card machine Drill press *Eyeletting machine* *Gumming and hinging reinforcing machine*	Punch press *Handwork on stationery* Welding Upfitting Assembling	Piece, equal Time, less	Women's day rate 20% lower than men's.	Women's output lower than men's; on punch press, 10%; on assembling, 15%; on drill press, 5%.
No. 116 Oil stoves 1,629 men 85 women	85	Bench work		Piece, less Time, less	Women's piece rates about 10% to 15% less.	Women's production equal to men's.
No. 117 Fire extinguishers 364 men 294 women	181	Machine work Soldering Lacquering Assembling		Time, equal	No women on piecework.	Women's output equal to if not better than men's.
No. 118 Iron and steel lath, studding, etc. 687 men 47 women	47	Drill press Spot welding Wiping	Cleaning Assembling, light Janitor	Piece, equal Time, less	Day rate for women 28c per hour, 7c lower than rate for men.	Output of women equal to that of men.
No. 119 Steel windows, doors, automobile springs 689 men 82 women	All except clerical	Punch press Drafting Janitor		Piece, equal Time, less	Women's day rates lower because of period of probation and instruction.	
No. 120 Lighting fixtures 306 men 133 women	None	*Foot press* *Power press*	*Lacquering* *Inspecting*	Piece, equal Time, less	Day rates about $1.00 per day more for men than for women.	On some processes women equal to men, on some 10% faster.

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No. 121 Lighting fixtures 537 men 43 women	None	*Decorating* *Lacquering* *Papering*			No basis for comparison.	Not on same work.
No. 122 Store fixtures 463 men 93 women	93	Machines Machine helper Finishing	Oiling Patching	Piece, equal Time, less	With few exceptions women do different class of work on day-work than men.	Women produce 33⅓ to 50% compared with male help in all operations.
No. 123 Silver-plated ware 250 men 95 women	None	*Graying* *Machine burnishing* *Packing*			No basis for comparison.	Not on same work.
No. 124 Aluminum cooking utensils 431 men 215 women	22	Press, light Riveting ears to kettles *Packing*	Stamp press Putting on wire bails *Wrapping*	Piece, equal Time, less		Output of women on riveting and stamping about same as men; on assembling, somewhat less but will be same with more experience.
No. 125 Porcelain and aluminum utensils 401 men 98 women	Not stated	Riveting machine Hammering dinges *Enameling* Sweeper	ALUMINUM WASHING *Inspecting* *Wrapping*	Piece, equal Time, equal		On washing aluminum, women's output about 35% greater than men's.
No. 126 Enameled kitchen utensils 500 men 250 women	None	*Dipping* *Drying* *Inspecting* *Labeling* *Sorting*		Piece, equal Time, equal		
No. 127 Enameled kitchen utensils 700 men 300 women	None	*Dipping* *Labeling* *Wrapping*		Piece, equal Time, equal	Same rates in effect, but men and women not on same work.	

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OUTPUT AND EFFICIENCY

Table 4 classifies the establishments listed in Table 3 according to the relative efficiency of men and women workers, as measured by output on the same respective processes.

TABLE 4: SUMMARY COMPARISON OF OUTPUT OF WOMEN WITH THAT OF MEN ON SIMILAR WORK, BY INDUSTRIES

(National Industrial Conference Board)

Classification of Establishments	Total number of establishments	Output of Women						
		Greater in all operations	Greater in some operations, equal in some	Equal in all operations	Greater in some operations, less in some	Equal in some operations, less in some	Less in all operations	Not comparable or not stated
Total	127	30	6	30	7	11	15	28
Automobiles and automobile accessories	10	1		3	1	2	1	2
Typewriters and other light machines	6	2		2		1		1
Electrical machinery, apparatus, and supplies	18	2		6	2	2	2	4
Foundry and machine shop products	37	12	1	11	1	2	5	5
Munitions	13	4		1	2	1	2	3
Railway equipment	7	1	1	1		3	1	
Tools, cutlery, and hardware	16	5	2	4				5
Miscellaneous metal products	20	3	2	2	1		4	8

Eliminating the 28 establishments in which, for one reason or another, no comparison can be made, this summary indicates that the output of women compares favorably with that of men, since it appears that in 30 establishments of the remaining 99 the output of women was greater than that of men in all operations on which both were engaged; in 6 it was greater in some, equal in others; in 30 it was equal to that of the men. In other words, in 66 establishments, or two-thirds of those furnishing definite information as to output, women's production was equal to or greater than that of men in the operations

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on which both were employed. In only 15 establishments was it found that women produced less than men in all operations on which they were engaged. Their production in the remaining 18 establishments, although less on some operations, was equal or greater on others.

It appears, moreover, that the efficiency of women did not depend on the nature of the industry as such, or to any marked extent on the fact that they had but recently been introduced into an industry. In none of these classifications do a majority of establishments report women always less efficient than men, and it is significant that in the manufacture of foundry and machine shop products, on which women were in the past seldom employed except as coremakers, 24 establishments report women's work equal or superior to that of men in all operations, as against 5 finding them inferior.

Analysis discloses that among those operations which some employers reported women to be performing less efficiently than men, there are very few which are not being carried on with much success by women in other establishments. For instance, in one automobile factory women are found inferior to men in light bench and machine work; yet in a similar factory and in many others doing similar work their output on the same processes is equal to or greater than that of the men.

An aeroplane manufacturer reports that women produce only half as much as men in assembling work or in welding, or in operating drills, punch presses, and hand millers; yet in other factories women have been found to excel men in all these operations except welding, and in welding at least one establishment has found them equal to men. Sorting and packing, reported as being done less rapidly by women in one machine tool establishment, are occupations in which they had already achieved marked success elsewhere.

The success reported in these cases suggests that extended experience, improvements in management, or other changes, might ensure to those plants where the output of women falls below that of men the same good results that are now secured by others in their lines.

Among operations which are nowhere reported to be performed as well by women as by men are chipping cast-

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ings, machine filing, lapping gauges, and brazing. The first two are somewhat heavy work for women. Women were doing machine filing in only two and brazing and chipping castings in only one of the establishments reporting.

Experience of Individual Establishments

Further light is thrown on the question by the statements of employers as to the operations successfully performed by women. In one automobile establishment women are working on shaving machines, milling machines, light drill presses, and lapping machines, and are doing bench work, light assembling, stock handling, and inspection of small parts. In regard to their output it was stated:

> On productive work, women as a rule are not as efficient as men, due to the fact that they have no mechanical knowledge of machines and do only what the job setters show them; also, on assembly work they take longer to understand the proper fits, etc., than a man. On nonproductive work such as stock handling, inspection, etc., the women are as good as the men, in some cases much better, as they are more thorough and careful. This is particularly true of the light work.

In another automobile plant, where women are employed in 23 departments doing the same types of work enumerated above and performing other tasks formerly carried on by men, they gave still greater satisfaction:

> The comparative output of women on the same process is almost invariably greater than that of the men, in some cases quite disproportionately so. In some cases, notably on a nut tapping machine, a woman was put on and at the end of the week she had turned out about double the quantity of the man working next to her, and after endeavoring to equal her speed for a few days, the man quit, and was replaced by another woman who is now very nearly the equal of the first. We find, particularly in assembly work, that the women are much more conscientious and painstaking than the men.

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The report of a gear manufacturing establishment where women are sand blasting very small castings and performing grinding, drilling, and broaching operations, indicated that their output is from 15% to 25% higher than that of the men.

An unusually striking instance of the efficiency of women in metal trades work appears in a recently published statement[1] of a New York gear manufacturing concern:

> On our three-inch Gleason generators, the largest day's production turned out by our best men operators on differential side gears was 91 pieces, and on differential pinions, 260 pieces for a nine-hour day. The slowest woman operator in point of production equals the best day's product by the men, and our speed merchants, as we call them, turn out 126 side gears and 320 differential pinions in a nine-hour day, an increase of 35 side gears and 60 differential pinions.
>
> On our twenty-four inch Fellows gear shapers the women turn out from 20 to 30 more pieces in a nine-hour day than the men.
>
> On our filing and burring machines, the women are far ahead of the men on production and accuracy. They overrun the men about 250 pieces in nine hours, and the small amount of work rejected by the inspectors is surprising, as compared to the amount that the inspecting department rejected when the same machines were operated by men.
>
> On our drill press work is where our women really shine. In one case they have increased the production 1,200 pieces in a nine-hour day. The case I speak of is putting on a radius and reaming the bore of differential pinions. This requires two operations on a two-spindle drill press, one operator putting in the radius and the other reaming the bore. The largest production turned out by two men was 3,200 pieces each; to date, two women have turned out 4,400 pieces each in nine hours, under exactly the same conditions, and it is hard to tell where they are going to stop. We have one woman who drills two $\frac{5}{32}$ in. oil holes $\frac{1}{4}$ in. deep and one $\frac{1}{8}$ in. hole $\frac{1}{8}$ in. deep in 246 stem gears in nine hours; this is 50 more pieces than the men ever turned out.

[1] David S. Earle. Address. Proceedings of the Second Industrial Safety Congress of New York State, 1917.

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One of the most conspicuous examples of success with women workers is offered by an establishment employing 5,000 women in practically all mechanical operations required in the manufacture of fuses. On the basis of time studies, a maximum of 375 standard pieces per day had been set for male turret lathe operators, who were turning out an average of 190 pieces; when women were employed on this work they produced 531 pieces. In the assembly department, where 2,000 girls are at work, the estimate by two sets of engineers for the best possible production by men was 15,000 complete fuses daily in two shifts; the average output actually obtained when women were employed was 38,000 per day in one shift. In this case, however, the excess of output actually obtained over the estimates was so great as to leave little doubt that some other factor than the superior efficiency of women was involved. The president of this company considers the endurance of women, as well as their rapidity, superior to that of men:

> In spite of the amount of work they do, they are not overworked. In fact, they seem to be able to keep up their high rate of speed better than the men. In one of the assembly departments, for instance, we tried men on a particularly trying job. At the end of three days they came to us and told us that the work was too strenuous. We put girls on the benches, and since then there has been no complaint.

In a steel establishment where women are employed in manufacture of fuses, women operators of drill presses and milling machines are found to be from 25% to 50% faster than men. Another manufacturer of small metal parts for munitions stated that women drill press operators handle 196 parts per hour on daywork while on nightwork men turn out only 148. Although the output on a day shift cannot fairly be compared with that on a night shift, this would not explain so marked a difference in results. In a bolt and nut establishment women working on drill presses and milling machines have achieved an average increase in output amounting to 30%.

An especially interesting illustration of the variety of work of women in railroad shops is given by a woman who has risen from mechanical work to an important

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executive position. In one of these shops women were employed as follows:

1 milling machine operator
2 coremakers
1 chipper
1 tinsmith helper
1 rivet heater
1 ordinary drill operator
1 tool dressing helper
4 hammer drivers
6 car preparers
4 upholsterer helpers
2 carpenter helpers
1 locksmith
2 lacquerers
1 turntable operator
4 yard laborers

In another, women were, in addition to these occupations, operating cranes, lathes, and boltheaders, and grinding drills. With regard to their efficiency it was stated:

> The comparative output of men and women on the same processes varies with the type of work. Usually the output is similar. One foreman said: "In quantity less; in quality women put out superior work."

Some incidental advantages mentioned by various manufacturers are pertinent in considering the introduction of women workers. Women are commended as being more thorough and conscientious than men, as spoiling less work, and as being more careful of tools. Even where the quantity of their work is less than that of male workers, the quality is frequently reported as better. Another valuable characteristic sometimes referred to is the regularity of women's output. A bolt and nail manufacturer employing women on pointing bolts, thread-cutting, nut tapping, filing, papering and packing bolts, reported their output as at least 10% larger, and added that the quantity can be depended on from day to day.

Absence of Restriction of Output

The reported superiority of women in some of the instances cited was so great as to suggest that restriction of output by men may have played a part in raising the comparative efficiency record of women. Certainly there is a strong probability that where phenomenal increases of output were obtained by women workers the men had not been working up to their capacity. The information obtained on this point was not sufficient to warrant conclusions. Evidence from other sources,

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however, suggests rather definitely that women are less inclined than men to practise arbitrary restriction. A statement made by the President of the British Iron and Steel Institute is pertinent:

> When it was found that the demands of the government for a greatly accelerated production of shells required the employment of girls in the projectile factory, owing to the scarcity of skilled workers, these girls in all cases produced more than double that by thoroughly trained mechanics — members of trade unions — working the same machines under the same conditions.
>
> In the turning of the shell body the actual output by girls with the same machines and working under exactly the same conditions and for an equal number of hours, was quite double that by trained mechanics. In the boring of shells the output was also quite double, and in the curving, waving, and finishing of shell cases quite 120% more than that of experienced mechanics.

Restriction of output by male workers in Great Britain before the war was admittedly very common; a large proportion of the increased production in that country is to be attributed to the absence of restrictive practices among women workers.

Yet in many types of light work women apparently are capable of bettering men's record even when the men do their best.

Present Limitations of Women's Efficiency

In reviewing this record of efficient performance by women it must be emphasized that most of the tasks on which they are engaged are semi-skilled work of repetitive character, in which rapidity, lightness of touch, and natural dexterity are more important than skill acquired through long training and experience.

The reports of employers often refer to the special deftness of women in handling small repetitive work, and in numerous plants departments have been arranged to secure a better routing of material and a subdivision of tasks which offer a maximum of light repetitive operations. This is doubtless the most direct road to the immediate successful utilization of female labor.

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It is too early to form conclusions as to the ability of women to perform work of higher skill. The necessity for immediate increase of output made it essential to give women specialized training for particular jobs rather than to develop them into general mechanics. Even in England, where in one place or another women are used in practically all operations in the engineering and munition trades, they have not received the broad general training which skilled workmen are given. Opinions of English employers have undergone considerable change during the course of the war. Although the subdivision of processes has secured most remarkable results, women collectively are doing much more than mere repetition work. According to one British report:

> Women have entirely destroyed our pre-war ideas as to what constitutes "skilled" work. When in the early days of the war women were trained to turn out 19 pdr. H. E. shell and equal the production of male labor, many thought that such work, amounting as it does to a little more than manipulative dexterity, was about the limit of the capacity of women who had not received a regular course of engineering training. After a few months workshop experience, however, women are today building the greater part of one of the best high-speed engines in the country, each woman setting her own tools and work, and able to machine any piece of work that the tool she is on will take.
>
> Women are doing magnificent work both in regard to accuracy and output.

It should be emphasized, however, that even where women are doing such work as setting up, assembling, or performing machine tool operations, they have been trained for a particular type of machine and for a limited range of operations. How far the present limitations of women workers, noted by both American and British manufacturers, might be overcome by broad technical training cannot be determined from experience now available.

WAGES

The following summary, compiled from Table 3, indicates the wage policy of establishments furnishing data for this investigation as reported in replies to the schedule of inquiry.

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In this table the column headed women's rates "Equal to men's" means that rates were the same for men and women whether on piece or day work respectively; in some cases women were engaged exclusively on piecework; in other cases on time work. The establishments listed in the column headed "Less than men's" also sometimes employed women exclusively on either piece or time work. In a few cases, as stated in the footnote, complete information was not furnished. Again, the operations were sometimes modified so that the work done by women, while similar to that done by men, was not identical; for instance, additional help was provided or only the lighter part of the operation performed by women. In such cases piece rates paid women frequently were lower than those paid men; in some other cases women were paid lower time rates.

TABLE 5: SUMMARY COMPARISON OF WAGE RATES OF WOMEN WITH THOSE OF MEN, BY INDUSTRIES

(National Industrial Conference Board)

Classification of establishments	Total number of establishments	Wage rates of women			
		Equal to men's	Piece rate equal to men's, time rate less	Less than men's	Not comparable or not stated
Total	127	53	29	24	21
Automobiles and automobile accessories	10	4[a]	1	3[b]	2
Typewriters and other light machines	6	2	2	2	
Electrical machinery, apparatus, and supplies	18	3	2	8[b d]	5
Foundry and machine shop products	37	18[a e]	8	7	4
Munitions	13	5	6		2
Railway equipment	7	6			1
Tools, cutlery, and hardware	16	9	3	1	3
Miscellaneous metal products	20	6	7	3	4

(*a*) In two cases time rates not stated.
(*b*) In one case piece rates not stated.
(*c*) In one case time rates not stated.
(*d*) In some cases piece rates equal.
(*e*) In one establishment some piece and time rates are less.

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Excluding the 21 establishments for which there was no basis for comparison this table shows that in 53 of the remaining 106, women received the same rates of pay as men, whether on time or on piece work; in 29, women's piece rates were the same as men's but their time rates were lower; in 24, both piece and time rates were lower. It may be noted in this connection that the U.S. Department of Labor has declared itself in favor of equal wages for women performing the same work as men on government contracts and that a similar position has been taken by the Director-General of Railways in ordering the recent wage increases and by the National War Labor Board, which has defined its policy in the following terms:

> If it shall become necessary to employ women on work ordinarily performed by men, they must be allowed equal pay for equal work.

The principle of equal wages for equal work found especially marked recognition among employers in those industries where the employment of women is a comparatively new feature. For example, 18 establishments manufacturing foundry and machine shop products pay women equal rates in all cases where they are performing the same work as men, while 8 pay them equal piece rates. In the munitions industry, 5 establishments pay equal rates and 6 others pay equal piece rates but lower time rates. The relatively large number of cases where women receive lower rates in electrical manufacturing probably is due to the fact that women have been employed in this industry for a much longer period and that certain occupations came to be regarded as women's work at a time when the principle of equal wages was seldom accepted.

Where the wages of women were less than those of men, the difference usually was from 10% to 25%, although in seven establishments there was a still greater difference. Various reasons were assigned for this lower wage scale. One machine tool manufacturer declared that it was the intention to pay equal wages as soon as the cost of changes made to allow the introduction of women has been recovered. Some stated that women's wages are gradually being increased as they become more efficient, with the intention of ultimately making them equal to those of men. In several places women are paid a lower time rate while learning, after which they receive equal pay on a piece-rate basis.

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Another reason offered for lower wages to women is the necessity of providing them with helpers to set up machines, to make repairs, and to bring up stock, or of introducing specially adapted tools.

The preceding discussion refers to rates of wages and not to earnings, which may differ although rates are equal, either on account of the individual capacities of the workers, their endurance, the hours of work, or for other reasons.

British experience has clearly demonstrated the value of the piece rate system as an incentive to output. Observations on women's eagerness to work continuously at high speed under a piece-rate system also point to the conclusion that maximum production is best secured from women employees by piece-rate payments. Yet this very eagerness to secure high wages and unwillingness to take advantage of rest periods suggest the danger of such an incentive unless proper health supervision is assured.

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III

ORGANIZATION AND EQUIPMENT

Inasmuch as women seldom have the skill to set up the machines they use, and are unable to perform operations involving heavy work or lifting unless male helpers are provided, some changes in the shop organization are often necessary in plants where women are employed in large numbers.

The employment of additional supervisors was the most frequent change in organization reported as necessitated by the introduction of women workers. It also appeared that this was one of the considerations which deterred some manufacturers from employing women. However, this disadvantage is not limited to the employment of women, for it exists to almost the same degree with inexperienced male workers. In this connection an English writer has said:[1]

> A staff of women whose service is measured by weeks or months stands necessarily at some disadvantage against a staff of men whose service is measured by years. Thus, in an old established shell factory, employing semi-skilled men before the war, the proportion of "toolsetters" to machines is raised from one to each twelve or fifteen, to one to each eight or ten after the entry of female labor. In another factory, also established before the war, 60% of the men adjust the tools themselves in one degree or another, the women being dependent entirely on the toolsetter.
>
> But the comparison lies in both cases between experienced men and inexperienced women; and in new factories established since the war and employing equally inexperienced male or female labor, the amount of supervision is said by more than one manager to be about the same for each.

[1]Barbara Drake: Women in the Engineering Trades. Fabian Research Department. London, 1917.

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So long as experienced men are available, the need for extra supervision of women obviously is an objection to be considered, though it should be borne in mind that many experts in scientific management have found that, even where men are exclusively employed, organization of workers in small groups with a maximum of supervision is most effective in increasing output.

Often women employees are grouped under the charge of a male supervisor who instructs them, oversees their work, and sets up the machines. Better results were as a rule reported where such groups were small. Sometimes a woman is assigned as an assistant to a skilled machine operator. Practically all employers emphasized the importance of some such form of supervision. One manufacturer wrote:

> The fact of importance gained by our experience with the employment of women in our manufacturing operations is the need of providing suitable supervision and leadership. Our experience is that the old line foremen are prejudiced against the employment of women, and will be antagonistic in their attitude, will prejudge the possibilities adversely, and under these conditions their employment will be doomed to failure. Supervision of a broadminded person convinced of the possibility of using women advantageously, and competent to adapt and alter the methods of work, is essential.

Several of the largest employers of woman labor kept their female employees in buildings or departments separate from the male workers, and others who have the introduction of women under consideration clearly indicated that they considered this arrangement desirable. On the other hand, a report[1] from a machine tool plant, where 1,100 women are employed with marked success, is as follows:

> It was believed by some that the best results would not be obtained by having men and women work together in the various departments, but that there should be separate departments for each. Experience has shown that there are advantages in having both in the same department, as it tends to hold the same standard of workmanship and speed

[1]L. D. Burlingame: War Work for Women. *Machinery*, April, 1918.

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> for women as for men, while it is believed that having a separate department for women may establish a separate and lower standard, the tendency being to make more allowance for women because of sex.

However, in all but two cases covered by this investigation, women working in separate departments are reported to be producing greater output than men on the same work. In one of the two exceptions the women are producing output equal in quantity but of better quality; in the other they are turning out 20% less than men.

From the standpoint of discipline, practically no difficulties were experienced from the mixing of the sexes. In many plants a forewoman is appointed for each department where women are employed. A plan sometimes advocated as an aid to discipline is to start the women to work a little later and dismiss them a little earlier than the men. This scheme, which is in use in a number of establishments, allows the women to prepare for the street and be well on their way home before the men are released from work.

Although women usually work in the same departments with men, it has been found desirable to introduce them a few at a time, especially where they must gain their first experience in the shop and not in a special training department. One manufacturer stated:

> We find that the indiscriminate placing of women on work that was entirely new to them was not very satisfactory, and we follow the practice of transferring some of our former female employees who have a strong personality, using one or two to start new work. This proved to be very successful, as the new female help would have some encouragement in their work by being placed with one or two of their own sex.

An advantage gained by mixing men and women at work is that the men can do the lifting and handling of heavy materials. As already pointed out, the need of providing helpers for women in many classes of work is regarded by some manufacturers as one of the drawbacks to their employment. The lower rates of wages paid to women in an automobile factory are attributed to the

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necessity of employing helpers to carry stock to and from machines. On the other hand, many industrial managers regard the employment of a lower paid helper to deliver and take away stock from more highly paid skilled or semi-skilled workers a desirable economy, even when men only are employed. A partial solution of this difficulty is the wider use of handling, lifting, and conveying machinery, wherever feasible.

In respect to organization of processes, factories in the United States are already better adapted to women workers than was the case in England before the war. In Great Britain, the conservatism of employers and the opposition of trade unions had combined to keep highly skilled men performing numerous complete processes instead of having the work subdivided and having highly standardized parts manufactured by automatic machines tended by unskilled or semi-skilled workers.

With suitable instruction many women could at once be absorbed into machine trades in the United States without the extensive reorganization and renewal of equipment which was essential in Great Britain. This is shown by frequent reports from manufacturers who had introduced women in large numbers without any accompanying changes whatever in plant or equipment.

However, a marked increase in the employment of women in this country would doubtless demand modifications of equipment in many factories.

METHODS OF TRAINING

Three chief methods of training women, which often shade into one another, have thus far been applied in this country: co-operation of the factory with local trade schools; installation of special training departments in the factory itself; instruction by foremen in departments to which women are assigned.

The Trade School

The first method, apparently not widely utilized, has the advantage of indicating the adaptability of the individual before she enters the factory. A three-weeks evening course is usually planned to give broad instruc-

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tion in the use of machines and tools, a general idea of factory conditions, the value of protective clothing, and safe work practices. The drawback to this form of instruction is that it does not give sufficient familiarity with specific operations on a specific machine. While an employee with this broad training gains confidence, considerable time and attention must nevertheless be devoted to her at the outset.

Experience in England in this field is that the most satisfactory results are secured, not in schools, where conventional pedagogical traditions have undue influence, but under actual factory conditions.

Special Training Departments

When inexperienced women are put to work in the factory without any preparation for it, the noise and activity produce at first a nervous tension that renders them more liable to accidents and causes them to produce a high percentage of spoiled work. Hence it has seemed desirable in many cases to maintain a special training department, separated from the rest of the factory, where machines and tools of the types to be used in actual manufacture are in operation. Many railroads now employing women in shopwork have trained their operatives in such schools.

Eleven of the establishments furnishing material for this study, which have in their employ 14,380 women, have training departments of this character, their distribution by products manufactured being as follows:

Automobiles	2	Cash Registers	1
Aeroplanes	1	Adding Machines	1
Shells and Fuses	2	Machine Tools	1
Electrical Apparatus and Supplies	1	Locks and Hardware	1
		Gears	1

It is significant that six of the eleven establishments which have introduced special training departments report that the output of the women exceeded that of the men in some or all of the processes on which they are engaged, while only one finds the output less in all processes. There can be little doubt that the better output of women workers resulted to a considerable extent from such training, and that corresponding advantages could be secured from similar training of male workers as well.

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In the training departments the new employees are usually divided into groups, seldom more than seven each, with an instructor for each group. One establishment which has had wide and successful experience in training of women workers claims that the best results are secured by using women instructors, since the new employees feel more at ease and more encouraged by recognizing the proficiency of those of their own sex. After the use of tools, properties of metals, and factory usages have been explained, the method of operating the particular machine is demonstrated. Each individual is then allowed to start on actual production under careful supervision. The use of precision tools and the reading of blueprints are usually made a part of the course.

When the best possible way of performing an operation has been determined it is generally held that it should be taught without permitting variations dictated by individual inclination. Unless it is found that the judgment of the employment department was at fault in selecting the occupation for the individual, changes are not made from one type of machine to another, and all the training is directed toward the acquisition of efficiency in one operation. The time required to prepare the operative for actual work in the factory by this course is from three or four days to two weeks, according to the natural ability of the worker or the skill required.

In some cases several establishments have co-operated in the inauguration of training schools. Such an industrial school has been established in Dayton, Ohio, by four large firms. Both day and evening courses, open to women as well as men, are offered in the operation of the lathe, shaper, drill press, hand screw machine, grinder, tapping machine, turret lathe, punch press, automatic screw machine, hand and power milling machines, and the profile machine, as well as in tool making and mechanical drawing. The instructors are successful journeymen with a thorough knowledge of their trade, who understand actual shop conditions and commercial requirements and who have aptitude for teaching. In this school a charge is made for instruction, whereas in factory training departments it is usual to pay a nominal wage to employees while learning. The certificate granted at the close of a course, however, practically guarantees employment to its recipient.

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Another idea which has several times been applied with advantage is the use of a factory that is working only day shifts as an evening school for training new employees. Instructors are secured from among properly qualified foremen of the establishment.

Instruction by Foremen

The third method of training women workers, and that most generally in use, is to give them more or less specific instruction through the foreman or forewoman of the department to which the recruits have been assigned, and to put them immediately to work. The widest variations prevail in different plants as to the time and attention expended in this way. Success has depended on a great diversity of conditions: the kind of industry; the extent to which women are already employed in that industry or establishment; the skill required for operations which the women are to perform; the type of equipment and machinery on which they are to work; and the amount and character of the supervision. For instance, in manufacturing razors or electrical goods, where tradition favors the employment of women and where many are already at work, it is found comparatively easy to increase the proportion of female workers without painstaking instruction of each new employee.

Some processes are so simple that a minimum of instruction is required. Coremaking and ordinary drilling are examples, as are also some kinds of assembling and inspecting. Where machinery specially designed for repetitive work is largely used, as in munition manufacture, the training of female operatives involves little difficulty.

The foremen are, of course, a vital factor in this method. On their tact, teaching ability, and open-mindedness toward the employment of women largely depends its success.

Selection of Women Workers

Where the introduction of women workers into an establishment is under consideration, a careful survey to determine where they can be employed most effectively is desirable. Sometimes arrangements are made to transfer men to the heavy machines where this is feasible, and the lighter machines of the same type are assigned to

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women. Similarly, men are often promoted to work requiring a slightly higher degree of skill, women succeeding them in their former tasks; this process of upgrading has proved a most efficient method of introducing women in munitions factories in England.

Once the positions to be filled by women have been determined, the requirements of the special occupation decide the choice among the applicants. A considerable expense for training is avoided by early knowledge of the physical fitness of the women for the tasks they are to undertake. For this purpose a physical examination is expedient.[1]

For munition work in England, women between the ages of eighteen and thirty-five are usually selected; most managers regard twenty-two to twenty-three years as the most satisfactory age for such work. This, however, contrasts with the experience of an American manufacturer who found that the older workers are usually so much more careful and steady and less given to change, that their continuous work brings their average production up to that of younger and more vigorous employees.

Previous factory experience has not been found essential. Nearly all British authorities agree that women formerly engaged in other factory work do not learn more quickly or make better workers in new occupations than intelligent and fairly well educated women unaccustomed to manufacturing conditions.

ATTITUDE OF WOMEN

Of 111 manufacturers reporting on this subject, 103 stated that the attitude of women toward their work was as good or better than that of men; 8 that it was worse. It should be taken into consideration that most of the factory work which women perform requires little initiative or self-reliance. A frequent absence of these qualities in women workers has often been noted in English discussions, although with the wider opportunities and experience which the war has brought the earlier views of employers have been considerably modified.

[1] In this connection it may be noted that the Foundry Safety Code of the American Foundrymen's Association and the National Founders' Association contains the following provision:

"No female shall be employed in a foundry unless upon examination by a competent nurse or physician it has been determined that she is of normal health, size, and weight."

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A frequent commendation of women is that they are "more teachable," and that they are "more conscientious and painstaking" than men, although in some establishments they are reported to learn more slowly. A common experience was that they "follow instructions better." An engineer[1] connected with a large establishment manufacturing electrical equipment observed:

> You can be sure that once a woman employee is taught how to use a gauge or learns what constitutes satisfactory work, the good work produced in the afternoon will be exactly the same as that produced in the morning. The judgment which is frequently so disastrous on the part of our men employees will not enter into the work of the woman operative. She will follow instructions absolutely.

Several employers declared emphatically that where differences of attitude exist between men and women, they are "in every case in favor of the women." Women are reported to be steadier and to display greater interest in their work; one manufacturer stated that they make less complaint about the work, another that their attitude "was better but that they were getting about as independent" as men.

A machine tool manufacturer having wide experience with women workers reported them "as exacting as men and no more." As a rule women show more appreciation of attractive surroundings and their attitude in general is more personal than that of men. These considerations have a practical bearing on their efficiency and also tend to create a better response to appeals to loyalty and patriotism.

An establishment manufacturing typewriters and employing over five hundred women found that women "do not carry the shop customs and traditions as men do" and "are more open in accepting prices for piecework."

The more docile attitude of the woman worker probably is due to some extent to the inferior strategical position she has occupied in the industrial world. Other factors which have deterred women workers from assuming the aggressive attitude taken by men are the comparative

[1]John W. Upp: The Woman Worker. Address to American Society of Mechanical Engineers, December, 1917.

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youth of most of them, their expectation that marriage will withdraw them from industry within a few years, their lack of training and the absence of united action. Although they talk more about what is unsatisfactory to them, the maintenance of permanent organizations by women has been exceptional.

It is worthy of consideration whether this attitude may not be influenced by changes at present taking place, which may be more and more widely extended by a long continuance of the war. In England, an indication of the growing independence of women workers is given by their tendency to organize. For instance, in 1916 the membership of the National Federation of Women Workers rose from 20,000 to 40,000, mainly munition workers, and in the same period the female membership of the Workers' Union increased to 35,000.

If wider opportunities, more specialized training, and increased competition for their services give women a more assured position in industry there is reason to expect a similar development in this country.

CHANGES IN EQUIPMENT

Replies from a considerable number of employers included in the present investigation indicated no changes in equipment following the introduction of women workers, or changes only in the direction of increased safety provisions. The following statement by a manufacturer of fuse parts is typical:

> No great changes in plant or machinery were necessitated by the employment of women, except that we took extra precaution in safeguarding machines and in instructing the women as to the dangers.

A machine tool manufacturer who employs women on all types of machine work summarizes the changes made thus:

> Safeguarding machines more carefully. Providing mechanical means for operating chucks and heavy machinery to avoid physical strain.

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Other employers specifically asserted that their machinery was already adequately protected; obviously this is desirable whether men or women are employed.

In several cases where increased war demands led to the employment of women on a considerable scale the additional equipment was chosen with the idea of its adaptability to female workers. An establishment manufacturing aluminum cooking utensils, which recently put women on riveting, stamping, and assembling, reported that it had made the machinery easier to operate, and had arranged for delivering materials and taking away finished articles.

In a nut and bolt establishment women engaged in sorting nuts were furnished lighter sorting pans than men.

A change in small tools is recorded by a manufacturer of ignition equipment, who stated that it was because of specially designed gauges, calipers, etc., that women could handle the work with the same speed as men.

Provision for clean, well-lighted workrooms is even more important for women than for men because their attitude —and therefore their efficiency—is much more influenced by æsthetic considerations. But as this is a decided stimulus to order, neatness, and regularity of habits, it is in any case desirable. One electrical manufacturing company painted with white enamel all machines operated by women, "not as a fad, but to promote cheerfulness."

Another arrangement important for women, and required by law in many states, is the furnishing of seats. A properly adapted chair may greatly reduce fatigue and thereby increase efficiency; this applies to men as well as to women. One writer has declared in a recently published article:[1]

> It has been found on some jobs the sitting position actually results in increased output. Some shops have made special efforts along scientific lines to develop a stool which will permit the operator to produce the most work with the least fatigue. Much actual shop production has been lost, because the traditions of the shop were "to stand up."

The importance of providing comfortable seats is emphasized in the final report of the British Health of Munition Workers Committee.

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[1]Harvey Dewitt Wolcomb: The Female Worker in Railroad Shops. *Railway Mechanical Engineer*, January, 1918.

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The fact that changes necessitated by the employment of women were comparatively few is probably due to the fact that a majority of the factories in the metal trades were already equipped with modern machinery. Where changes were made the employers almost without exception reported the outlay to be justified by results. Furthermore, many such modifications in organization and equipment are no less desirable for men than for women. These changes often represent not so much adaptations to the needs of women workers as tendencies of modern manufacturing toward more efficient organization, more expert supervision, increased standardization, greater safety, and the general substitution of machine for hand-power.

ACCIDENTS

Prevention of accidents among women is of even greater importance than among men. In machine trades, bruises and lacerations of the fingers or hands are a frequent type of injury, and although they usually do not permanently impair the capacity of the worker they may involve more or less conspicuous mutilation. It is obvious that injuries of this kind are of much more serious concern to a woman than to a man. The frequent occurrence of such accidents in an establishment might deter other women from taking up the work and even drive away those already engaged in it. Furthermore, a disposition among women to talk over accidents is another consideration in their employment on machine work.

Comparatively little specific information was secured on the subject of accidents. In a majority of cases it was reported that the accident rate was lower for women than for men, but as a rule no accurate figures or even estimates were given, simply the opinion that accidents to women were "not more frequent than to men," were "less frequent," or "very few."

Many manufacturers attributed this to the fact that women were engaged in work of less hazardous character than were the men, or that other influences contributed to reduce the proportion of accidents among women. For instance, one establishment employing 1,100 women, many of whom work on milling machines, gear-cutting machines, cutter grinding machines, lathes and other machine tools, reported that there were only four-fifths

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as many accidents among women as among men in proportion to the number employed, but stated that the women were less exposed to danger.

In a munition establishment with a highly developed hospital department where records are carefully kept, the proportion of accidents for men and women employees respectively for four successive years was as follows:

Year	Males	Females
1914	1.21	.42
1915	2.05	.83
1916	1.81	.94
1917	1.50	.63

Here the proportion of accidents among women is conspicuously lower than among men in every year covered by the report. However, since the report does not indicate whether women were employed on occupations as hazardous as those of men and does not state whether the accidents to women were of equal severity, it does not afford a basis for definite conclusions.

The only striking exception to the evidence that women meet with fewer injuries than men was reported by an establishment where women are employed on light punch presses. Here accidents to women were estimated to be one-third more numerous than to men, but again the proportionate exposure and the character of the injuries sustained were not specified.

A government report on women in the metal trades, based on an investigation in 1908, covering comparative accident rates of men and women press operators in 18 establishments with a total of 2,080 men and 2,013 women for a period of a year, showed that for the entire group the number of accidents to women was about one-third greater than to men. A significant feature of this tabulation was that of the accidents to women, practically 60% occurred during the first week of employment and over 36% on the first day of employment as compared with approximately 35% and 19% respectively in the case of men.[1] The latter figures indicate clearly that the learning period is peculiarly dangerous for women workers and emphasize the desirability of a thorough training for women when they are introduced into shopwork. Such

[1] 61st Congress, 2d Sess. U. S. Senate Document 645. Employment of Women in the Metal Trades. Washington, 1911.

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training appears to be more necessary for women than for men, as many women have little or no previous mechanical experience.

The relatively favorable experience with respect to accidents among women apparently was influenced by the fact that they were frequently employed on less hazardous occupations, and that greater precautions were taken in safeguarding machinery. Furthermore, practically all employers make a point of giving special safety instructions to women, and several firms attribute the smaller proportion of accidents to this policy.

With respect to courage and self-control in the case of major accidents, such as explosions in munition factories, experience in Great Britain and France indicates that women compare very favorably with men.

Clothing

A large number of employers stated that protective clothing was worn by women workers in their establishments. As a general rule full-length aprons with closely fitting sleeves were considered an adequate protection against injury where machinery was properly safeguarded; close-fitting caps or nets to prevent loose hair from being caught in shafts, belts, or gears were generally regarded as essential.

In some establishments so much machine work was performed by women that they were required to wear bloomers or overalls, sometimes termed "feminalls" or "bloomeralls"; in some other plants the practice, while not made compulsory, was strongly encouraged by furnishing the clothing at half price or at cost. When the reasons for wearing protective uniforms were explained usually no opposition was encountered. Objections are more easily removed if the garments are well designed, well cut, and of an agreeable color. Such clothing, however, has been seriously objected to by some large employers on the ground that it tends to attract an undue amount of attention from male workers and thus interferes with discipline; in at least one establishment difficulty arose because the garments were worn at a shop picnic. It would appear that less trouble is experienced in small establishments, and particularly where the women workers were relatives of the men, or acquainted with them prior to their employment.

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OCCUPATIONS UNSUITED TO WOMEN

It was the consensus of opinion among employers furnishing information that women should not be employed on work which required much lifting or straining, such as heavy machine operations, trucking, or yard labor. For instance, a manufacturer of filing cabinets considered work on large punch and shearing presses as unsuitable for women, since it necessitated the handling of large pieces of metal. Certain other machine operations were regarded by some employers as unsuited to women. In order to determine the proper limits of women's employment in a specific industry it is desirable that a survey be made which will take into consideration not only the relation of each occupation to health but the general custom of the locality and the available supply of male workers. Whether a given operation is adapted to female labor also depends, to a considerable extent, on the character of the labor-saving equipment provided.

These opinions agree in substance with experience of employers in Great Britain. According to the British Factory Inspectors' Report for 1916:

> There is hardly a process of any sort on which women are not employed to some extent, the one absolute limit to the replacement of men lying in those heavy occupations where adaptation of plant or appliances cannot be effected so as to bring them within the compass even of selected women of physical capacity above the normal.

In some instances legal regulations restrict the work which women may perform. For instance, a New York State law provides that women shall not lift weights in excess of twenty-five pounds. Similar legislation has been enacted in other states.[1] In some states women are allowed to move heavier articles if mechanical aids such as boxes mounted on rollers or castors are provided. Other evidences of efforts to safeguard the health of women workers are found in the standards formulated by councils of defense, labor bureaus, and other industrial associations.

[1]The U. S. Ordnance Department has set twenty-five pounds as the maximum weight to be lifted by women. The Foundry Safety Code of the American Foundrymen's Association and National Founders' Association contains the provision: "No female employed in a foundry shall lift any object exceeding thirty-five pounds in weight unless she uses mechanical means by which her physical effort is limited to thirty-five pounds."

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Grinding of metal parts is forbidden to women by the laws of New York. Manufacturers in other states, however, are employing women on this operation somewhat extensively. One objection made to such work is the danger arising from the particles of metal dust; another, the dirty character of the work. To a large extent these disadvantages are overcome by the installation of suitable blowers. Some types of tool grinding, however, are of such a highly skilled character that women are not likely to be employed at such work so long as men are available.

Presence of acid fumes is a hazard which occurs in numerous occupations, and since British experience has shown that women are more susceptible to fumes than men, it is important to make ample provision against this risk. Occupations involving exposure to very high temperature are also generally regarded as unsuited to women.

Some employers suggested the exclusion of women from exceptionally fine work or work requiring unusual patience. Against such opinions, however, are to be placed the experience of other manufacturers that women display superior patience and care and also excel on lighter types of work.

Operations requiring specially high skill were considered unsuited to women. As a matter of fact women are at present automatically disqualified from such work, since the opportunities for acquiring even a limited degree of proficiency have been lacking until very recently. A munition manufacturer stated in this connection:

> We have found it impossible to employ women on many of the machining operations which are not included in the "repetition" class; this on account of the absence of skill and training and the lack of time available to give this skill and training.

It is highly probable that this practical situation will not be altered unless still greater demands on man-power are made by the war. While there may be exceptions, as a rule it seems unlikely that women will for a long time rise above the ranks of semi-skilled workers. But since improvements in machinery tend to reduce the need for highly skilled artisans of long training this may not prevent the extensive employment of women.

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IV

ATTENDANCE, LABOR TURNOVER, AND HOURS OF WORK

ATTENDANCE

Among factors which influence a decision as to the employment of women must be reckoned their attendance record, which industrial experience in the past has quite generally shown to be below the standard attained by men.

The following table summarizes the data bearing on this point obtained in the course of the investigation.

TABLE 6: ATTENDANCE OF WOMEN WORKERS COMPARED WITH ATTENDANCE OF MEN IN 115 ESTABLISHMENTS
(National Industrial Conference Board)

	Establishments		Women Employees	
	Number	Percent of Total	Number	Percent of Total
Total	115	100.0	38,500	100.0
Women's attendance better than men's .	44	38.3	10,481	27.2
Women's attendance equal to men's . .	40	34.8	9,974	25.9
Women's attendance . worse than men's .	31	26.9	18,045	46.9

From these figures it appears that in 44 of the 115 establishments the attendance of women employees is better than that of men; in 40 equal; and in 31 worse. On the basis of the number of women employed the showing is, however, different, since the establishments where women's attendance was worse than that of men included 18,045 workers as against 10,481 in those establishments where their attendance was better, and 9,974 in establishments where it was equal.

Analysis of the sources from which the women workers were recruited by these establishments did not disclose

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any reason for the variations in their attendance, nor did the differences appear to be explained by the type of work performed, since practically all operations on which women were engaged were represented among those establishments reporting poor attendance of women, as well as among those reporting it as good or better than that of men.

There was an apparent relation between the number of women employed and their attendance. In 27 of the 44 establishments where women's attendance was reported as better than men's, and in 20 of the 40 where it was equal, 100 women or less were employed, whereas of the 31 establishments reporting their attendance as worse, 26 employed a larger number. Although it cannot be determined from the data available, there is a probability that more individual adjustment and greater attention to health factors and to morale were possible where only a few women were employed.

While, therefore, the replies to the schedule of inquiry did not indicate a significant difference between the attendance of men and of women, when experience in other industries and other countries is considered it appears that a higher average time loss because of absence must be counted among the unavoidable disadvantages connected with the employment of women.

Attendance of Married Women

Contrary to rather generally expressed opinion, it appeared that attendance of married women was fully equal to that of younger unmarried girls. The following table summarizes the information secured on this point:

TABLE 7: ATTENDANCE OF MARRIED WOMEN WORKERS AS COMPARED WITH SINGLE WOMEN, IN 76 ESTABLISHMENTS
(National Industrial Conference Board)

	Number of establishments	Number of women	Number of married women	Percent of married women to total number of women
Total	76	15,666	2,222	14.2
Women's attendance better than men's .	33	4,965	575	11.6
Women's attendance equal to men's . .	23	3,488	723	20.7
Women's attendance worse than men's .	20	7,213	924	12.8

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Relation of Illness to Attendance

No significant data were submitted in respect to the relation of illness to attendance of women workers. There is little doubt, however, that their poor attendance is largely due to illness. One-sixth of the women leaving their employment in a large machine tool plant gave poor health as their reason, a much larger proportion than among men.

Experience in Germany on this point is of interest. Data collected by the Leipzig Sick Benefit Society from 1887 to 1910 shows that, among metal grinders and polishers, women averaged 1,456 days of sickness compensated for per 100 members as compared with an average of 1,215 days for men; among iron founders and machinists, women 1,666 days; men 1,189.[1] The compensation records of German Sickness Insurance Societies[2] from 1903 to 1908 indicate a 3% to 5% higher average time loss by women in most occupations than by men.

While these German figures include accidents they nevertheless indicate a higher illness rate among women.

The experience of a benefit society maintained in a large American silk factory is also significant. In March, 1918, $1,124.35 were paid in benefits to 1,079 women members as against only $761.75 to 1,843 men members. For the entire period from November 1, 1910, to March 31, 1917, the claims paid to men amounted to only $91,580.35 out of their contributions of $116,686.76, while the claims paid to women were $87,592.51, more than twice their contributions of $41,640.04.

A comparison of days lost through illness in 1914 by approximately 16,000 employees of the Government at Washington, D. C., over 4,000 of whom were women, showed that the women averaged 8.90 days per annum, the men only 4.82.[3]

All these figures indicate either more frequent or more serious cases of illnesses among women than among men.

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[1] Kober and Hanson: Diseases of Occupation and Vocational Hygiene.

[2] U. S. Commissioner of Labor. Twenty-fourth Annual Report. 1909. Workmen's Insurance and Compensation Systems in Europe.

[3] U. S. Public Health Bulletin, No. 76. Health Insurance.

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LABOR TURNOVER

Although poor attendance was frequently a disadvantage connected with women's employment, the greater stability of the female labor force offered some compensation. Of 94 employers reporting the comparative labor turnover of women and of men, 8 found that women's record was worse, 26 that it was equal, 60 that it was better, often by 20% to 30%.

A frequent comment by employers is that women are "steadier than men."

One reason advanced by some employers for the smaller turnover among women employees was their superiority to the class of men at present available. Another important consideration is that skilled men now have more opportunities to better their position by reason of keen competition for their services, and therefore are tempted to change from one factory to another.

Among the elements favoring stability of women employees has been the practically unlimited supply. Women, once secure in their positions, were naturally conservative about changing, and the sharp competition in the labor market reinforced this tendency. But the generally observed disposition of women to take their work and its surroundings more personally may, by proper organization of the factory, be made a valuable auxiliary in the reduction of labor turnover. Again, the home associations of women are more likely to restrain them from seeking employment beyond a limited field, since they usually feel a greater reluctance about breaking domestic ties and frequently have stronger social motives for remaining in their accustomed environment.

Yet an analysis of some of the cases reported indicates that with women, as with men, an increase in the demand for workers will be accompanied by a more active labor turnover. One manufacturer stated that high wage rates are making his women workers dissatisfied and that they are "trying out every job possible until they find something that suits." The treasurer of an establishment manufacturing machine needles reported a marked shortage of girls and a labor turnover of female employees 20% higher than that of men. In a bolt and nut factory in Cincinnati it has been found necessary to hire twice as

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many women as men to maintain the force in a department where the majority of the women employed are working. Moreover, since a shortage of female labor is reported in many cities by the United States Employment Service, competition for women workers, unless regulated, will naturally increase, especially for those who have acquired some degree of mechanical skill. Nevertheless, even if radical industrial changes rendered women workers as much valued and sought after as men are at present, it is probable that both social conditions and psychological characteristics would restrain them from shifting from place to place as freely as men.

HOURS OF WORK

Working hours of women employed in industrial plants are limited by law in most states of the Union. The following list shows the daily and weekly maximum hours prescribed by law in states where the establishments included in this investigation are located.

TABLE 8: LEGAL LIMITATIONS OF WORKING HOURS FOR WOMEN IN STATES WHERE THE ESTABLISHMENTS INCLUDED IN THIS INVESTIGATION ARE LOCATED

State	Daily hours	Weekly hours
Indiana	No limit	No limit
Iowa	No limit	No limit
Illinois	10	—
New Jersey	10	60
Connecticut	10	55
Wisconsin	10	55
Massachusetts	10	54
Pennsylvania	10	54
Rhode Island	10	54
Michigan	9*a*	54
Minnesota	9	54
Missouri	9	54
New York	9	54
Ohio	9	50
California	8	48

a As an average; 10 in any one day.

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Table 9 shows the weekly nominal hours of work for women reported by 106 establishments, arranged geographically. In many establishments the hours for women were shorter than for men.

TABLE 9: WEEKLY NOMINAL HOURS[a] OF WORK FOR WOMEN IN 106 ESTABLISHMENTS, BY STATES

(National Industrial Conference Board)

Geographical distribution	Total establishm'ts	56 or over	55	54	53	52	51	50	49	48	Under 48
Total	106	2	11	27	1	7	1	32	5	16	4
California	1									1	
Connecticut	11		7	3*b*				1			
Illinois	5	1		2*c*		1				1	
Indiana	4		1			1		2			
Iowa	1	1*b*									
Massachusetts	12			5		2	1	3		1	
Michigan	17			7		1		7			2
Minnesota	1									1	
Missouri	2							2			
New Jersey	6		2	1				1*b*		2	
New York	17			7*c*	1	1		1		6*b*	1
Ohio	23							13	5	4	1
Pennsylvania	3			1		1		1			
Rhode Island	2			1				1			
Wisconsin	1		1								

a In a very few cases hours are fractionally greater than indicated in the heading.
b One establishment shorter hours in summer.
c Two establishments shorter hours in summer.

This table shows that in 57 establishments women were working not over 50 hours per week, while in 49 they were working longer hours, in most cases either 54 or 55. In 58 establishments in those states where a legal limit is set, women are working fewer hours than the law allows. The number of establishments reporting women employed on night work was almost negligible.

The following table, showing weekly nominal hours of work for women in the same establishments, by industries, makes it apparent that the specific industry as such had little influence on the length of the working day for women, since in each of the industries included the hours of work varied widely.

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TABLE IO: WEEKLY NOMINAL HOURS[a] OF WORK FOR WOMEN IN 106 ESTABLISHMENTS, BY INDUSTRIES.

(National Industrial Conference Board)

Industry	Total establishm'ts	56 or over	55	54	53	52	51	50	49	48	Under 48
Total	106	2	11	27	1	7	1	32	5	16	4
Automobiles and automobile accessories . .	9			4				4			1
Typewriters and other light machines . . .	5			1				1		2	1
Electrical machinery, apparatus, and supplies	15		1	2	1	1		7*b*	1	2	
Foundry and machine shop products . . .	32	1		10*c*		4		8	2	6*b*	1
Munitions	11		3	2		1		2	1	2	
Railway equipment . .	3					1				2	
Tools, cutlery, and hardware	14		3	5*b*			1	3	1	1	
Miscellaneous metal products	17	1*b*	4	3*b*				7		1	1

a In a very few cases hours are fractionally greater than indicated in the heading.
b One establishment shorter hours in summer.
c Three establishments shorter hours in summer.

Idle Factory Time

The character or arrangement of work in many industries leaves more or less time during factory hours when employees are not engaged in actual physical effort or in concentrated attention.

An attempt was made to secure data on this point concerning women employees in the metal trades, but a question regarding the actual time lost because of pauses, waiting for stock, changes in tools and machinery, and similar interruptions, met the general response that the length of such delays was difficult to determine and that any statement must be based only upon estimates. No accurate data are available, but estimates by manufacturers place the loss from zero up to 25%, and in one case, 50%; they most frequently ranged from 10% to 20%. The proportion varies, of course, in different occupations. In a machine shop where the average time lost was estimated at 20%, it was put as high as 40% for gear cutting operations and at 10% for small turret lathe

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work. A manufacturer of electrical equipment who has had large experience with women workers for a number of years stated:

> In setting tasks for women it is our practice to allow an average of 20% for lost time. This allowance varies according to the nature of the work from 15% to 25%, but we believe 20% is a fair average.

A machine tool establishment where women perform all kinds of machine and bench work reported as a rough estimate that for about forty-five minutes per day of nine hours women employees are not engaged in actual physical effort. A very small part of this was attributed to waiting for work or stock, or to delays caused by the management, but the loss was largely due to ordinary relaxations attending employment.

On the other hand several establishments reported the proportion of idle factory time as practically negligible. In one plant women performing machine operations were shifted to bench work during repairs or setting up; in another, extra machines were available. In other cases, routing of stock was so carefully planned as to reduce delays to a minimum.

It should be remembered, however, that where no provision is made for systematic rest periods, chance pauses contribute to the recuperation of the employees. Furthermore, such time losses are also common where only men are employed.

Rest Periods

The relation of regular pauses during work hours to output and to avoidance of accidents is receiving increasing consideration by students of labor problems as the importance of the subject is made more evident by scientific research and practical experiment. Rest periods are evidently of special importance for women. Of the 127 establishments furnishing data for this investigation, only 20 were maintaining systematic rest periods; in three others they had been tried but discontinued. Several other manufacturers stated that they were seriously considering their introduction. The total number of women employed by the 20 firms was 18,546, of whom 14,954 were in 6 establishments manufacturing munitions.

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In most of the factories where rest periods have been established, the pause varies in length from five to fifteen minutes, usually in the middle of the forenoon and afternoon. In one factory a ten-minute rest period is allowed in the morning; in another, ten minutes near the end of the day; in a third, the women are at liberty to leave their machines two or three at a time for a lunch period once in the forenoon. It is doubtful whether the full benefit of the practice is secured by the last method, since the time allowed is not definitely specified, and there is danger that ambitious workers will cut short or omit the pause allowed.

In some establishments light physical exercise or recreation such as music or dancing is combined with rest periods.

The length and distribution of rest pauses is sometimes determined by the character of the work. For instance, in a munition factory where women are engaged on operations which involve close concentration and considerable eye-strain, a rest period of five minutes is allowed at the end of each hour.

Many of the opinions expressed were favorable to the plan of two rest periods a day. An establishment manufacturing cash registers reports:

> We have recess periods of 10 minutes in the morning and 5 minutes in the afternoon. We have had this plan in operation a number of years and are thoroughly sure that it is profitable to the employees as well as to the company.

A plant making machine tool fixtures, with 140 women at work, reported:

> We allow women employees 15 minutes rest in the forenoon and afternoon. They also stop work 5 minutes earlier at noon and 10 minutes at night, making 45 minutes in all; we find it works out very satisfactorily.

In numerous establishments where no regular rest periods are arranged, the understanding is that women workers may rest when they feel it is necessary.

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An automobile manufacturer stated:

> We have not inaugurated rest-periods in our factory; but the women in our employ are at liberty to leave their work at their pleasure. Where it is necessary, we have utility women to fill in in such cases.

A compulsory rest period would probably be of greater advantage to both employer and employees. Workers take rest periods, whether they realize it or not, but often at irregular and ill-chosen intervals. Moreover, women are generally reported as more inclined than men to overwork, and the temptation of a high piece rate may lead them to continuous overexertion which ultimately contributes neither to the output of the establishment nor to the health and earnings of the worker.

In some other factories rest periods of an indefinite character are under control of supervising matrons in the different departments, who look after the general physical welfare of women workers.

In the majority of establishments making no specific provision for rest periods, apparently little attention had been given the subject. Usually no comments were offered, but it was sometimes stated that the work was very light, or that rest periods were not needed, or that the workers could rest when they pleased, as they were employed on piecework.

In a very few instances employers reported no positive advantage from rest periods. A munition establishment stated that the results were "intangible." In this case pauses were allowed only to women polishers and inspectors. A manufacturer of enamel ware employing women on dipping, labeling, and wrapping did not consider the practice of special value. In one factory where rest periods were tried but given up, the workday was proportionately shortened.

In some factories opposition comes from the employees who do not wish to lose the time from piecework. Such objections of pieceworkers do not appear to be well founded, since rest pauses do not necessarily involve a loss in production. One large typewriter factory reported:

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> The management has established two general rest periods of ten minutes every day, which have proved to be very satisfactory. By means of a chart plotted some time after the installation of rest periods, a slight increase in production was shown to have taken place. While it is not claimed that this is due to rest periods, it at least shows that there has been no loss in product due to this cause.

Extensive evidence, notably the experience of British munition factories, indicates definitely that rest periods are advantageous from an economic point of view both to employers and employees. In British factories tea is often served to the workers at their machines during rest periods. This custom is generally regarded as a valuable aid to output. A similar practice prevails in some American establishments, where milk is furnished at cost.

In its final report the British Health of Munitions Workers Committee said:

> Pauses, well distributed and adapted in length to the needs of women workers, are of the highest value in averting breakdown and in giving an impetus to output. The Factory Acts permit in textile factories a maximum of four and a half hours continuous work; in non-textile the limit is five, but many managers believe that four hours is the longest period during which a woman can maintain continuous work at full vigor. Within this period a pause of ten minutes has been found to give excellent results, and where the spell is continued for five hours some such pause should certainly be made for a cup of tea or cocoa. It is particularly valuable in the morning spell in those numerous cases where breakfast has been hurried or omitted altogether.

In view of the favorable results obtained from rest periods, the problem calls for most careful investigation, to which employers can contribute valuable assistance by observation of the results of experiments as to the proper length of the pause and its position in the work period as well as its relation to the type of occupation and worker. Such considerations, moreover, are applicable to men as well as women workers.

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Hospitals, Rest Rooms, and Lunch Rooms

Provision of such facilities as first aid and hospital rooms, rest and lunch rooms, as well as generally attractive working surroundings, are especially important where women are employed.

As a large number of the establishments furnishing data for this investigation had employed some women in manufacturing processes previous to August, 1914, they were not obliged to make material changes in their arrangements.

Installation of rest room or lunch room facilities, or both, was reported by a majority of employers introducing women on factory work for the first time. The appointment of a matron to take charge of the rest room is a very general practice; in many cases there is a matron for each department. Sometimes where hospital and first aid facilities were already maintained, special arrangements were made for the treatment of female employees in case of accident or illness.

When a separate department or factory was added, such accommodations for women were, of course, made a part of the general plan. Where women were taken into a plant already in operation, it was more difficult to arrange for such facilities without the loss of valuable space for manufacturing. Nevertheless, practically all employers reporting on this point expressed themselves as satisfied that results justified the cost. The following comment from an establishment which has just introduced 90 women on the manufacture of shells is representative:

> The employment of women in this particular plant has resulted in not only the women being provided with rest rooms, lunch room, first aid room, etc., but has resulted in better accommodations for the men in the way of locker room, first aid room, extra toilets, etc. We believe the expenditure has been justified in view of the better accommodations and the good feeling inspired in general among the employees.

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V

DEMAND AND SUPPLY

DEMAND FOR WOMEN WORKERS

During the first year after the United States entered the war the general introduction of women into occupations previously filled by men was discouraged in many quarters. At the beginning of 1918 the United States Secretary of Labor was quoted as expressing the opinion that there was an ample supply of labor both for the army and for industry; that the problem was one of proper adjustment and that it was the policy of the Labor Administration to prevent the introduction of women into new occupations as long as men were available.

This attitude was reflected in the position taken by many state councils of defense and other official bodies. Private associations interested in safeguarding labor standards were also extremely conservative toward the wider employment of women. At the end of 1917 reports issued by the New York State Industrial Commissioner and by the American Federation of Labor maintained that employment difficulties arose not from a real labor shortage but from defective distribution, due to increased activity in some industries receiving war contracts and to greatly reduced business in industries not essential for the prosecution of the war. Many manufacturers were of the same opinion.

Today, however, the needs of industry are becoming more urgent. The United States Employment Service[1] in May, 1918, estimated that from 3,000,000 to 4,000,000 workers will be required in essential occupations, including agriculture, during the next twelve months. It is reasonably certain, therefore, that there must be a far-reaching occupational readjustment, which will compel the admission of more and more women workers to industry.

[1]U. S. Employment Service Bulletin. May 21, 1918.

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In the United States the proportion of the female population now employed is approximately 8%, as against 26% in England. To make the number of women employed in the two countries proportionate would mean the addition of 8,152,135 women to the ranks of industry in the United States. While such a radical readjustment as was effected in England may never be necessary, preparations for the gradual introduction of women into industry can be most satisfactorily made now, while the proportion of skilled men is still so high that changes should not seriously interfere with production of materials required for war purposes.

SOURCE OF SUPPLY

In the discussion of women's employment in occupations new to them, it has often been assumed that they came from a class not previously employed. That this would be highly improbable, at least, might be inferred from the experience of other belligerent countries. After the early months of unemployment in Great Britain, immediately following the outbreak of the war, one of the most marked features of the labor market was the shifting of workers from slack industries to those experiencing unusual activity. For example, it is estimated that in Great Britain, 400,000 women were drawn from the domestic servant class and from small dressmaking establishments into the war industries, which offered higher wages. Of 1,407 female workers in a French munition factory in 1915, all but 480 had been previously employed in some wage-earning occupation.

In Canada, where the labor situation is much more comparable to that in the United States, such a shifting from the so-called "women's industries" was also characteristic. The Deputy Minister of Labor for Canada reported that "the movement of woman labor was chiefly from the poorer paid to the better paid industries."

Many employers interrogated in this investigation likewise secured their women workers from other factories, though not necessarily from the same occupations. One manufacturer of elevating and conveying machinery, employing nearly a hundred women, stated that 50% of them were previously doing machine work. An automobile manufacturer who utilizes women chiefly on sewing

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machines in the trim department obtained them largely from those doing similar work in other factories. The majority of the winders in a plant manufacturing ignition apparatus had been similarly employed elsewhere. In one establishment women who are molding, and making, carrying, and packing cores are largely Belgians who were accustomed to doing heavy manual work in their own country.

Some employers did not even go outside their own plants to secure women for new work, but simply transferred them from one department to another. In some establishments women previously employed as inspectors or assemblers were transferred to machine work. An employer who intends to introduce women on a large scale within a few months reported that he should give the preference to friends and relatives of his employees. This plan has already been successfully tried in several establishments. In other cases such transfers were carried out among the male employees so as to avoid introducing women on shopwork. For instance, one employer reported it to be his policy to transfer men from clerical to mechanical positions when that could be done, filling the office vacancies thus created with women. He stated that training had developed many inferior clerks into good mechanics.

Frequently women who have entered the metal trades in the present war labor emergency came from a great range of occupations not immediately related to their new employment. An automobile manufacturer employing 423 women in 23 different departments reported that they had seldom been previously engaged on machine work. In another automobile plant where nearly 300 women are engaged in various types of machine and shop work, the force was recruited approximately as follows:

> 25% assemblers from other plants; 20% machine hands from other plants; 20% clerical workers from other plants; 20% from housework; 5% from laundries; 5% from restaurants; 5% had not worked before.

Sometimes the influence of local industries is evident in the source of labor supply. For instance, a machine tool establishment obtained employees from operatives in cotton and woolen mills; a firm manufacturing valves

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secured its female workers from nearby knitting mills; and a manufacturer producing small munition parts drew on department stores, cloak and suit manufacturers, electric lamp factories, and domestic service.

Reports from the Associated Charities in several cities indicate a decided increase in the employment of negro women in many kinds of manufacturing establishments; as yet this class of female labor has not been extensively utilized in the metal trades and similar industries. In a recently published article[1] the representative of a company manufacturing steam fitters' supplies recommended negro women for the operation of light semi-automatic machines, punch presses and drill presses, at the same time suggesting that least friction will result if they are employed in departments separate from the white workers.

Higher wages were an important factor influencing the shifting of female labor. Thus women formerly in domestic service constitute a considerable proportion of new workers in the metal trades; the shorter hours and other working conditions may have been an added consideration. To some extent this also explains the movement of women from other industries into the metal trades. At the end of 1917 a leading textile journal contained a warning to manufacturers in the cotton and woolen industries that they must improve the surroundings and working conditions in their factories in order to meet the competition of war industries for woman labor and reduce their turnover.

In 85 establishments reporting for the present investigation, 17.3% of a total of 22,750 women employees were married. Many men who have entered the national service were the only wage-earners in their families and very frequently wives who were employed before their marriage have found themselves obliged to return to work. Employment of an increasing proportion of married women in industry has, however, been one of the striking social changes of the past thirty years.

In England the first instalments of war workers, especially those trained in technical schools, were secured through regular employment channels, through advertising, and through canvassing friends and relatives of

[1] D. N. Crosthwait, Jr.: Making up the Labor Shortage. *Industrial Management*, May, 1918.

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those already employed, but the British Government has since drawn on a more educated type. Whether it will be necessary to recruit workers from this source in the United States will obviously depend on the duration and future demands of the war.

ATTITUDE OF MEN WORKERS

While the introduction of women into some occupations, notably into street car service, has resulted in strikes in various parts of the country, their increased employment in the metal trades has been attended with singularly little difficulty. Of 94 employers reporting on the attitude of their male workers toward women taking up new work, only 7 found it hostile; 52 reported it indifferent, and 35 favorable. A substantial proportion of these employers had women doing some class of work in their factories previous to August, 1914; of the 7 manufacturers who encountered hostility among the men, 3 were introducing women in factory work for the first time.

A large number of employers reported quiet acquiescence or even friendly co-operation of their men. A munition plant employing 694 women found that "the male workers in the establishment accepted the introduction of female workers in new processes as inevitable, and there was no friction." In a factory making electrical and refrigerating machinery, where a few women have been put on machine work, the men are described as being "very friendly and willing to help them." Again and again the reported attitude is "remarkably satisfactory," "very favorable," "friendly," or is described by a brief but expressive "O.K."

A few manufacturers refer to men as being "curious at first," but even where women are working side by side with men no appreciable social difficulties have been experienced.

One reason for the more favorable attitude of men is that they do not at present feel the competition of women, since there is no lack of work. For instance, one manufacturer reported "no trouble, as we are unable to replace women to any great extent with men." A manufacturer of planers who has just introduced a few women into his

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blueprint department stated that the men "seem indifferent now, but we think when jobs are not so easy to get it will be different."

A very important consideration which tends to a satisfactory attitude of men toward the wider employment of women is that the introduction of women frequently results in the promotion of men to supervisory positions, and that women employees are frequently friends or relatives of the men.

FUTURE OF WOMEN IN METAL TRADES

Opinions of manufacturers as to the desirability of the wider employment of women in the metal trades were as a rule favorable. For instance, the head of a munition establishment employing nearly 700 women in various manufacturing processes, said: "Highly desirable from a business standpoint; from our experience approve of employment of women in occupations at present engaged in."

A woman railroad executive in close touch with women workers in railroad shops, reported:

> From personal observation and study, I would say that the employment of women in occupations recently opened to them is most desirable economically, especially during and after the war. They are needed, are equal to the task, and eager to help win the war.

Of the manufacturers who submitted their views a majority evidently based their replies on individual experience from a factory standpoint with relatively little consideration of the general industrial situation or the broader social issues involved. Favorable opinions were often merely expressions of satisfaction with the immediate results. Thus, among 90 employers who considered the introduction of women desirable, 61 had found the output of women in their establishments on some work greater than, or equal to, that of the men; 5 found it equal in some cases; while only 6 found it always less than that of the men; the others made no statement concerning comparative output. As 5 of the 6 manufacturers reporting the women's output always below that of the

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men were paying the women lower wages, the actual cost of production possibly was not greater than when men were employed.

It is therefore fair to conclude that the opinion of manufacturers favorable to the wider introduction of women on men's work is chiefly related to their factory experience. Further evidence that the question was seldom considered in its broader significance is furnished by the fact that 44 employers replied merely "yes" to the question regarding the desirability of the wider introduction of women, without further comment or discussion.

On the other hand, several employers regarded the employment of women in metal trades as undesirable under normal conditions and as justified only by the war emergency. Thus, an official of a railroad company employing a few women as laborers or coach cleaners and on machine work, held that such substitution of women should be "during war and readjustment only." A large automobile company which in the past three years has substituted about 100 women on work previously done by men stated that many of them had been introduced "for sociological reasons," and expressed definite opposition to the wider introduction of women into industry. An official of this company reported that it would "employ women for work now done by men only when it became absolutely necessary."

The president of a cutlery manufacturing firm employing 205 women took a very conservative attitude toward the general introduction of women into industry on social grounds, as follows:

> The future of the race depends absolutely upon the moral strength of the women and if the employer of labor is not of the calibre that builds this moral strength, there is great danger in the employment of women.

Of thirteen employers considering it undesirable to introduce women more extensively on work previously done by men, four had no previous experience with female labor on new occupations in their establishments.

There was somewhat more difference of opinion as to the probable permanence of women in their new fields of

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work. Several manufacturers were of the opinion that after the conclusion of the war women would continue in the occupations recently taken up by them. Thus, an automobile manufacturer expressed the opinion that the employment of women in the metal trades would be "permanent on light work to which women can particularly adapt themselves," but he predicted that for the heavier classes of work his establishment would return to male help. In most cases the opinion was expressed that business conditions and particularly labor conditions after the close of the war would be the controlling factor in the future of women's employment. In the event of a marked oversupply of skilled workers among men there appeared to be decided agreement that a large proportion of the women who had been recently introduced into new occupations would be forced to withdraw. On the other hand, should the war go on for a long period and result in the introduction of a large number of women workers into the metal trades and in making them efficient in skilled operations, it was felt that the prospects of their permanent employment in the industry would be greatly increased.

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SUMMARY

Experience of employers in the metal trades in the United States has clearly demonstrated the practicability of employing women in a large variety of manufacturing operations. In a majority of establishments included in this investigation where women were employed in the same work they have equaled or excelled men in respect to output. In some processes their superiority is marked. As a rule, however, they have not been employed on highly skilled work and it is on light repetitive work requiring little experience or initiative that they have made their best record. Nevertheless, it cannot fairly be concluded from available evidence that women are unfitted for highly skilled operations, since, in this country at least, they have had no adequate test of their ability. In Great Britain women have proved themselves efficient in some skilled operations. It is the consensus of opinion that women should not be employed on heavy work, or on machinery where the accident hazard is distinctly high, or on work where extreme temperatures, poisonous fumes, or other serious health hazards are involved.

The principle of equal wages for equal work has found fairly general acceptance among employers in the metal trades. Systematic and intensive training of women workers, subdivision of operations, adaptation of equipment, organization in small groups under intelligent supervisors, and adequate compensation under the piece-rate system contribute effectively to maximum production in establishments where women are employed.

For the training of women, chief reliance has been placed on practical instruction in the factory. It is important that such training be conducted by fair-minded supervisors who have no prejudice against the employment of women in new occupations.

Women are found to be somewhat less regular in attendance at their work than men. Labor turnover thus

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far has been lower, but it is by no means certain that this can be regarded as a permanent condition. The attitude of women frequently is reported as more receptive, steadier, and more conscientious than that of new men workers at present available.

The proportion of accidents apparently is lower among women than among men in the establishments covered by this investigation, due partly to emphasis placed on safety instructions and increased safeguarding of machinery, but especially to employment in the less hazardous occupations.

State regulations frequently provide a shorter workday for women than for men; but in many cases the schedule hours worked by women are less than the maximum permitted by law. In approximately half of the establishments reporting on hours, women were working not over fifty hours per week.

Although comparatively few employers in the metal trades have experimented with rest periods, a growing interest in the subject is apparent. There is much evidence, notably in the experience of British munition establishments, that such pauses do not necessarily reduce output but may even increase it. Provision of such facilities as first aid rooms and hospitals, rest and lunch rooms, as well as generally attractive surroundings, are especially desirable where women are employed, but many of these facilities are of almost equal importance for men.

Substitution of women for men in the metal trades has not yet been extensive. In the establishments represented in this investigation women thus far have been chiefly drawn from other industrial occupations rather than from the ranks of those previously unemployed; it is probable, however, that an increasing number will be secured from the latter source if the available supply of men continues to decrease as the result of the war.

While the permanent employment of women in the light occupations in the metal trades is regarded by many employers as desirable, their continuance will doubtless depend largely upon the condition of the labor market after the war. It is noteworthy that as yet little objection has been made by men to the introduction of women into new occupations. But it cannot be assumed that this

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attitude will remain unchanged if the competition of women workers becomes more keenly felt.

It should be repeated that this report discusses the question from the narrower standpoint of the practicability of employing women at new occupations and does not include the question whether, from a broad social point of view, an extension of women's work is in normal times desirable.

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Research Report No. 1. Workmen's Compensation Acts in the United States — The Legal Phase. 62 pages. April, 1917. $1.00.

Summary of Research Report No. 1. 8 pages.

Research Report No. 2. Analysis of British Wartime Reports on Hours of Work as Related to Output and Fatigue. 58 pages. November, 1917. $1.00.

Research Report No. 3. Strikes in American Industry in Wartime. 20 pages. March, 1918. 50 cents.

Research Report No. 4. Hours of Work as Related to Output and Health of Workers — Cotton Manufacturing. 64 pages. March, 1918. $1.00.

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Research Report No. 7. Hours of Work as Related to Output and Health of Workers — Boot and Shoe Industry. 76 pages. June, 1918. $1.00.

Research Report No. 8. Wartime Employment of Women in the Metal Trades. 80 pages. July, 1918. $1.00.

Research Report No. 9. Wartime Changes in Cost of Living. [*In preparation.*]

Research Report No. —. Hours of Work as Related to Output and Health of Workers — Wool Manufacturing. [*In preparation.*]

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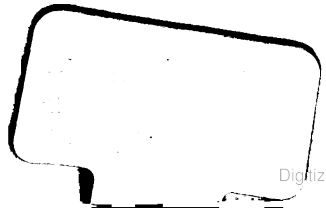
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